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SECOND REPORT OF CANADA UNDER THE 1987 PROTOCOL TO THE 1978 GREAT LAKES WATER QUALITY AGREEMENT

ISSUES OVERVIEW

Prepared by: **The Government of Canada and the Government of the Province of Ontario under The 1986 Canada-Ontario Agreement Respecting Great Lakes Water Quality**

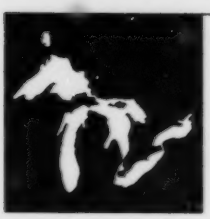
December 1990

"The Parties [Canada and Ontario] agree that their long term strategic objective is to restore and protect the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem as a multi-use resource whose base provides the setting and foundation for social development and economic investment."

Article II, Strategic Objective, Canada-Ontario Agreement

This report is dedicated to all citizens of the Great Lakes Basin who have contributed in the past and who will contribute in the future to the preservation and restoration of this vital resource for present and future generations.

Photographs courtesy of Environment Canada, the Ontario Ministry of the Environment, the Ontario Ministry of Natural Resources and the U.S. Army Corps of Engineers.



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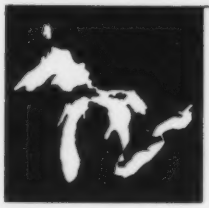


INTRODUCTION

The Great Lakes - A Valued Resource

Water is an essential ingredient for sustaining life. The Great Lakes are the largest supply of fresh water in the world. It is not surprising that people living in the Basin are deeply concerned about the quality of the Great Lakes Basin Ecosystem.

Historically, early explorers and settlers were drawn to the Great Lakes Basin as a means of transportation and a source of drinking water. Today, the Great Lakes Basin is home to one third of Canada's population and provides drinking water to approximately 35 million Canadian and American citizens. This abundant resource supports a host of activities - transportation, boating, fishing, swimming and a variety of industrial processes.

Canadians and Americans together have witnessed a slow, disturbing deterioration of the Lakes, especially in the last half of this century. Government and non-governmental organizations began to address these concerns, initially focusing on limiting inputs of phosphorus to the Lakes. Phosphorus had contributed to unsightly and unhealthy algal growth, especially in Lake Erie, which at one time was dramatically declared "dead". Although phosphorus control measures were expensive to implement, they have been highly successful.

Just as this very visible problem was beginning to come under control, awareness was growing of a problem that is less visible and much more difficult to correct. This is the presence of persistent toxic chemicals at levels which would have a long term detrimental impact on the health of the Great Lakes Basin Ecosystem. The community living in the Great Lakes Basin has been struggling to face this relatively new challenge, while still maintaining efforts to reduce conventional pollution. All members of the community are part of the problem, and all are needed to bring about solutions. Governments have their unique and important role to play, as do industries and the public. Through partnerships we can work together for a healthier and cleaner Great Lakes Ecosystem.

Public Concerns

The concerns of Basin residents are expressed in a variety of ways, ranging from consumer acceptance of green products and high support for local recycling programs, to active involvement in public interest groups and other organizations which are turning their attention toward the environment.

Many organizations have published their views and proposals with respect to Great Lakes water quality as part of their contribution toward mobilizing action from all sectors. These include:

- Conservation Council of Ontario - **An Environmental Strategy for**

Ontario: Draft for Public Review, 1990

- Greenpeace - **Water for Life**, 1989
- The Institute for Research on Public Policy - **Great Lakes, Great Legacy?**, 1990
- The Rawson Academy for Aquatic Science - **Towards an Ecosystem Charter for the Great Lakes-St. Lawrence**, 1990
- The Royal Commission on the Future of the Toronto Waterfront - **Watershed**, 1990.

Other groups in the region, such as Great Lakes United, have played a key role in keeping the public informed about actions being taken within all sectors.

The Canadian public has also clearly indicated its concern for personal health and the health of future generations. Recent polls indicate that many Canadians see themselves as part of the ecosystem and not immune from the effects of pollution.

Response from Industry

Industry has not turned a deaf ear to public demands for responsible action. The "polluter pays" principle seems to be an ethic that is accepted and expected by Canadians. There are many examples of corporations which have shown leadership in shouldering their share of the responsibility. Some companies have incorporated new technologies within their operations while others have established environmental protection as an element of their corporate strategies.

Response from Governments

The 1978 Great Lakes Water Quality Agreement was an extraordinary instrument that focused on a single ecosystem. In the years following the signing of the 1972 and 1978 Agreements, despite all that was being done, pollution in the Great Lakes was still a serious problem. Therefore, in 1987, a Protocol amending the 1978 Canada-U.S. Great Lakes Water Quality Agreement was signed, reaffirming the commitment of the governments of Canada and the United States to work with citizens and industry to restore and protect the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem.

In Canada, both the federal and the Ontario provincial governments work together in implementing responsibilities under the Great Lakes Water Quality Agreement. They do this through a partnership called the Canada-Ontario Agreement Respecting Great Lakes Water Quality (COA). This is the formal mechanism by which the Ontario provincial government commits to undertake those Great Lakes Water Quality Agreement requirements falling within its jurisdiction. Members participating in COA include the Federal Departments of the Environment, Agriculture, Fisheries and Oceans and the Ontario Ministries of the Environment, Agriculture and Food, and Natural Resources.

Under the 1987 Protocol, the International Joint Commission (IJC) is assigned an evaluative role. The IJC is required to make a full report to the federal governments of Canada and the U.S. and to the state and provincial governments on a biennial basis. This Protocol also requires that the two Parties, Canada and the United States, report biennially to the IJC on progress in implementing the specific Annexes of the Agreement.

In fulfilling this role, the IJC has listed 36 recommendations in its **Fourth Biennial Report** and 27 in its **Fifth Biennial Report**. Within the framework of meeting the requirements of the Protocol, both Canada and the U.S. have agreed to respond publicly to these recommendations within their respective Reports.

The First Report of Canada, released in February, 1989, highlighted initial progress in implementing the 1987 Protocol. During the last two years, a number of new and challenging initiatives

have been developed and undertaken in partnership with various federal and provincial government agencies, regional and municipal governments, industry representatives, non-governmental organizations and individual citizens.

This document constitutes the **Second Report of Canada under the 1987 Protocol** and has been written jointly by Canada and Ontario under the auspices of the Canada-Ontario Agreement. Some programs included in the report do not fall directly under the requirements of the Great Lakes Water Quality Agreement, but do contribute to the overall progress on the Great Lakes.

This Report has been organized into two volumes. The first volume, entitled **Issues Overview**,presents issues that Canada and Ontario have been involved with during the reporting period of January 1, 1989 to December 31, 1990. A companion report, entitled **Technical Summary**, provides a more detailed description of activities undertaken to meet the requirements of the 1987 Protocol. Canada's progress and its response to the IJC's recommendations are provided within the context of this report. The responses are tabulated in Appendix Two. The Table of Contents for the **Technical Summary** is included in Appendix One of the **Issues Overview** as a reference for the reader.

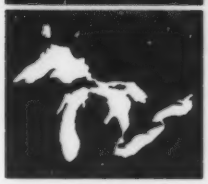
Since the 1988 **First Report of Canada**, many new initiatives have been launched towards cleaning up the Great Lakes Basin. The Great Lakes Action Plan, the Great Lakes University Research Fund, Canada's Green Plan and the Pollution Prevention Initiative are examples of the federal government's ongoing commitment to the Great Lakes Water Quality Agreement. The Municipal-Industrial Strategy for Abatement (MISA) under the Ontario Environmental Protection Act, the Industrial and Municipal Direct Discharger's Monitoring Program, the Waste Management Program, Stationary Source Control, the Strategic Plan for Ontario Fisheries II, the Watershed Management Planning Strategy and the Ontario Round Table on Environment and Economy are new or continuing programs of the Ontario provincial government related to Great Lakes water quality.

Under the Great Lakes Water Quality Agreement, specific programs require public consultation. Canada and the Province of Ontario are committed to meeting this requirement. For example, Public Advisory Committees (PACs) have evolved into an integral component of the Remedial Action Plan (RAP) process, which fulfils a requirement under Annex 2 of the Agreement which involves the cleanup of Areas of Concern (AOCs).

Other programs involving consultation with non-governmental organizations, industry and the public are:

- the development of binational ecosystem objectives;
- the Niagara and Lake Ontario Toxics Management Plans;
- the federal Great Lakes Action Plan;
- Health and Welfare Canada's new Great Lakes Health Effects Program; and
- the Ontario Ministry of the Environment's Municipal Industrial Strategy for Abatement (MISA).

The Government of Canada and the Province of Ontario are proud to be part of the co-operative efforts under way to restore, enhance and protect one of the world's most precious and unique global treasures – the Great Lakes.



NEW INITIATIVES

Citizens of the Great Lakes Basin have said loudly and clearly that they want cleanup. The call for action has been levelled at all of us: government leaders, the business community, the labour movement, the scientific community, civil servants and policy-makers, and private citizens. Each of us, within the scope of our individual and societal responsibilities, has been asked to restore and maintain the integrity of the Great Lakes Ecosystem and prevent further damage.

This chapter highlights new initiatives undertaken by governments, non-governmental organizations and industry on the Canadian side of the Great Lakes Basin.

I. THE 1987 PROTOCOL

The 1987 Protocol to the Great Lakes Water Quality Agreement clearly recognized that although the basic framework provided by the 1978 Great Lakes Water Quality Agreement was still relevant, certain aspects needed to be strengthened while other new requirements needed to be added. The Protocol signifies the renewed commitment of Canada and the United States to pursue the objective of virtual elimination of persistent toxic substances from the Great Lakes Ecosystem and the philosophy of zero discharge. New provisions cover:

- Areas of Concern (AOCs);
- Lakewide Management Plans;
- contaminated sediments;
- non-point source pollution (urban and rural);
- airborne toxics;
- human health risks;
- new ecosystem and water quality objectives; and
- groundwater.

Public Involvement in the Great Lakes Action Plan

Provision is made for public involvement in each of the three components of the Great Lakes Action Plan. Local Remedial Action Plan (RAP) public advisory committees collaborate with RAP Teams to develop and implement Cleanup Fund projects. The Health Effects Program of the Great Lakes Action Plan also includes many public involvement mechanisms, described in the following pages.

External input into the Preservation Program, and into overall planning of the Action Plan, comes primarily through a Great Lakes Action Plan Strategic Advisory Committee. This Committee is composed of key community members from labour, industry, citizens' groups and academia. It meets on approximately five occasions per year, one of which is a full-day workshop to integrate advice into the annual workplanning exercise. Committee members, while not strictly "representatives" of the sector from which they are drawn, do bring their own unique perspective to the planning process and this helps to clarify public expectations and facilitate effective planning.

II. NEW FEDERAL INITIATIVES

A The Great Lakes Action Plan

In response to the challenge posed by the demands of the 1987 Protocol, the Canadian federal government initiated, in 1989, a five year $125 million Great Lakes Action Plan to clean up the Great Lakes.

The Action Plan has three components: a $55 million Cleanup Fund; a $50 million Preservation Program; and a $20 million Health Effects Program. Programs under the Great Lakes Action Plan are co-ordinated through the federal Great Lakes Working Group, which is chaired by the Department of the Environment. Six federal agencies contribute to the Action Plan: Environment Canada, Fisheries and Oceans Canada, Health and Welfare Canada, Agriculture Canada, Transport Canada and Public Works Canada.

The Action Plan is not in itself the ultimate solution, it is one of several steps in the right direction. It serves as a stimulus to the corporate sector, private citizens and other government agencies, including the U.S. federal government, to contribute to the overall cleanup efforts being made by the Canadian federal government.

i) The Great Lakes Cleanup Fund

The Great Lakes Cleanup Fund, a component of the Great Lakes Action Plan, is administered by Environment Canada. This $55 million Fund was designed as a portion of the federal contribution to the implementation of Remedial Action Plans (RAPS) for Canada's 17 Areas of Concern (AOCs). The goal of the program is to restore beneficial uses in these Areas of Concern and to work towards their eventual delisting as highly polluted areas. The program is guided by the principle of "polluter pays". Projects are referred to specific RAP Teams and the federal Great Lakes Working Group for review and consultation with the appropriate Public Advisory Committees (PACs). Projects which focus on the prevention of pollution and zero discharge of toxic pollution are integral to cleanup efforts. Depending on the nature of the project, contributing partners can include federal, provincial or municipal agencies, industry, and interest groups.

Priorities for cleanup include the assessment, removal and treatment of contaminated sediments; wastewater technology; habitat rehabilitation; and non-point sources of pollution.

The Cleanup Fund, initiated in 1990, made commitments to projects totalling $2,781,000 in Thunder Bay, Nipigon Bay, St. Marys River, Severn Sound, Collingwood Harbour, St. Clair River, Detroit River, Hamilton Harbour and Metro Toronto and Region. In addition, four projects totalling $1,840,000 are also being funded to develop and demonstrate pollution prevention and cleanup technologies applicable to all AOCs.

ii) The Great Lakes Preservation Program

The Preservation Program constitutes $50 million of the $125 million Great Lakes Action Plan. In addition to providing resources for the development of Remedial Action Plans and Lakewide Management Plans, the Preservation Program is designed to address, in a comprehensive manner, the wide-spread contamination of the Great Lakes Ecosystem by toxic chemicals. The program has five components which address the major pollution aspects of the Great Lakes as well as the requirements of the 1987 Protocol to the Great Lakes Water Quality Agreement: Ecosystem Health; Land-based Pollution Sources; Pollution Associated With Shipping Activities; Contaminated Sediments; and Airborne Contaminants.

- The Ecosystem Health component is aimed at maintaining the physical, chemical and biological integrity of the Great Lakes Basin Ecosystem. Activities undertaken within this component are linked and managed in conjunction with the Great Lakes Health Effects Program.
- The Land-based Pollution Sources component is designed to strengthen efforts to address contamination of the Great Lakes Ecosystem resulting from a variety of land uses.
- The Shipping Activities component addresses pollution associated with marine transportation and related activities, including warehousing and ballast water disposal.
- The Contaminated Sediments component is designed specifically to address problems associated with polluted sediments.
- The Airborne Contaminants component addresses the loading of toxic chemicals into the Lakes and onto the surrounding land.

iii) The Great Lakes Health Effects Program

The $20 million Great Lakes Health Effects Program of the federal Great Lakes Action Plan is designed to meet the new human health orientation of the 1987 Protocol. Managed by the Department of National Health and Welfare, it includes five features:

- acquisition and evaluation of data on the levels and effects of environmental contaminants (chemical, radiological and microbiological) as they relate to human populations;

Public Participation in the Great Lakes Health Effects Program

The purpose of 1990 public participation initiatives was to inform the public and agencies about the Great Lakes Health Effects Program and how to become involved, to receive public input in defining Great Lakes Health Effects Program projects and its public participation plan, and to initiate partnership activities. Key activities carried out in 1990 include:

- *a Public Participation Workshop, July, 1990, co-hosted by Great Lakes United and Health and Welfare Canada;*
- *writing of a Citizen's Guide to health regulations, standards, and guidelines, to be distributed by Great Lakes United in 1991;*
- *development of a multi-faceted public participation strategy with new initiatives starting in 1991;*
- *financial and planning support for the International Joint Commission's television conference for teachers working around the Great Lakes, held on November 17, 1990;*
- *an interagency/public planning workshop in Cornwall in October, 1990, to address program objectives and strategic approaches;*
- *production of an hour-long video on Human Health and Toxic Chemicals in the Great Lakes Basin, to be available in April, 1991; and*
- *participation in Town Hall meetings in Thunder Bay, Windsor, and Sarnia.*

Advisory Committee for Great Lakes Health Effects Program

An external Advisory Committee was established to advise the Great Lakes Health Effects Program on key health and environmental issues within the Great Lakes Basin, to help define its programs and priorities including a comprehensive public participation strategy, and to provide linkages between various stakeholders addressing Great Lakes health issues.

The twelve-member Committee has representation from health and environmental groups, academia, municipalities, aboriginal peoples, industry, and the IJC. In its three meetings to date, it has provided advice on the goals and strategies of the Great Lakes Health Effects Program, the projects being planned for 1991-92, and on the implementation of a public participation strategy. The Committee meets on a quarterly basis to assist in setting the agenda for the Great Lakes Health Effects Program.

- health-risk assessment of current and potential exposures of populations within the Basin;
- protection of public health from concurrent exposure to mixtures of chemicals from all sources;
- public participation and information exchange on health issues in the Basin; and
- sound interagency program co-ordination and management.

During the first full year of the Great Lakes Health Effects Program, which commenced in April, 1990, the Department of National Health and Welfare initiated an extensive public consultation process and a range of research projects examining Great Lakes contaminants and human health effects. Human health research addressing Great Lakes issues includes:

- completing and publishing a review of what is known about the effects of Basin contaminants on human health;
- launching six population studies to address the concerns of both native and non-native residents of the Basin;
- launching 20 studies on the effects of specific pollutants or mixtures of pollutants;
- finalizing 211 toxicity profiles for chemicals in the Great Lakes Basin and inserting human health considerations in the development of ecosystem and specific chemical objectives;
- preparing the design criteria Basin-wide for a human tissue sampling program and a human tissue "bank" to determine current and future levels of population exposure to contaminants;
- initiating the development of human biomarkers and bioindicators that can be used to monitor the health of human populations; and
- establishing a binational, interagency communication linkage system for emerging health issues in the Basin.

B The Great Lakes University Research Fund

In an effort to encourage partnerships and multidisciplinary ecosystem research, the Government of Canada has allocated part of the $125 million of the Great Lakes Action Plan to the Great Lakes University Research

Fund. The Great Lakes University Research Fund, developed in partnership with the Natural Sciences and Engineering Research Council (NSERC), is a $1 million a year fund.

The Great Lakes University Research Fund is a commitment to the greater scientific community working on Great Lakes issues. Such a commitment also addresses the science aspects and research needs as defined in the Great Lakes Water Quality Agreement. The Fund supports university-based studies aimed at a wide range of Great Lakes environmental concerns. This four year program is administered by Environment Canada's National Water Research Institute in Burlington, Ontario. The deadline for first year applications was November, 1990, and the first awards will be granted in February, 1991.

C Canada's Green Plan

In early December, 1990, the Government of Canada launched its Green Plan - a mandate for environmental issues in Canada until the year 2000. Great Lakes Water Quality Agreement efforts will be strengthened as a result of Green Plan initiatives.

The Green Plan will provide funding over the next six years to fulfil Canada's contribution to a new binational Pollution Prevention Initiative for the Great Lakes and St. Lawrence River Basins. (See Section D: The Pollution Prevention Initiative.)

The Green Plan will also create a National Environmental Health Action Plan. One major emphasis will be a comprehensive study, to be developed and implemented in co-operation with native people, to assess the health risks posed by contaminants to native people living in the Great Lakes Basin. Mechanisms will be developed to ensure their health protection. Further, the provisions of water and sewer systems to Indian reserves in the Basin will be accelerated as part of a National Drinking Water Safety Act. The Health Action Plan will also include a St. Lawrence Health Effects Program to address health concerns of Canadians living in the St. Lawrence River Basin.

On the fisheries side, the Green Plan will fund a national database on contaminant levels in fish, the state of fish health and the status of fish stocks. The Great Lakes fisheries will be a component of this initiative.

The Green Plan will focus attention on toxic chemicals, including the establishment of mobile incinerators for the destruction of PCBs for Ontario; a National Toxicology Network to be established at a Canadian university within the Great Lakes Basin; funding for the Wildlife Toxicology Fund; and the establishment of further regulations and control options for a range of industrial toxic substances.

The Green Plan will also fund the extension of activities under the Southwestern Ontario Soil and Water Environmental Enhancement Program (SWEEP) for the control of phosphorus loadings to the Great Lakes.

Further, federal environmental assessment activities and emergency preparedness will be strengthened by the Green Plan.

D The Pollution Prevention Initiative

Pollution prevention is not a new concept. However, now more than ever, there are compelling reasons for focusing on prevention rather than remediation. New technologies have been and are being developed. There is much research being undertaken to find non-hazardous substitutes for hazardous material. There is the realization that the costs of restoration, particularly in the areas of contaminated sediments, groundwater and non-point sources of pollution, are astronomical. Pollution prevention is seen as a more economically viable solution to avoid past errors and to maintain a healthy environment.

In July of 1990, the Canadian Environment Minister and the U.S. Environmental Protection Agency Administrator announced a binational effort on pollution prevention. This initiative addresses the long term goal of virtual elimination of toxic substances into the Great Lakes-St. Lawrence Ecosystem through conservation-oriented policies and activities, comprehensive public participation and partnerships, and institutional change to accommodate a multimedia approach.

Highlights of the initiative include:

- development of a comprehensive Great Lakes-St. Lawrence plan for pollution prevention;
- establishment of a Great Lakes Pollution Prevention Centre to act as a focal point and catalyst for action on pollution prevention;
- demonstration projects for state-of-the-art technology for various industrial

sectors and committees in the Great Lakes Basin;

- multi-stakeholder involvement including all sectors of society; and
- a bilateral conference on Great Lakes pollution prevention.

E The St. Lawrence Action Plan

Although the Canada-United States Great Lakes Water Quality Agreement defines an arbitrary boundary for the Great Lakes system, the Government of Canada recognizes that the Great Lakes and the St. Lawrence River are all part of the same system. Consequently, the Canadian government launched the St. Lawrence Action Plan in 1988 with the multi-faceted mandate of: reducing by 90 per cent the liquid toxic waste being discharged into the river by the 50 industrial plants considered the biggest polluters; establishing a marine park and protecting threatened species and habitats; developing plans for decontaminating the federal sites bordering the St. Lawrence; enhancing dredging methods and technologies to create new wildlife habitats from dredged material; and developing environmental industrial technologies and toxicity gauges.

The Plan is based on a partnership among the different levels of government, the private sector and universities. Agreements have been signed for this purpose by various federal and provincial authorities.

The St. Lawrence Centre was established to manage a major portion of the research called for under the St. Lawrence Action Plan (50 per cent of the total Plan budget). The Centre is in an ideal position to act as a catalyst and an integrator by promoting co-operation among the various partners.

The St. Lawrence Centre's ongoing efforts focus on environmental technology, ecotoxicology, organic chemistry, water resource management and state-of-the-environment assessment. By the end of its present mandate, it is expected to achieve the following goals:

- establishment of a system for monitoring ecosystem quality;
- reduction of toxic inputs;
- development of pollution control and restoration technologies;
- development of expertise in the management of large river systems; and
- preparation of a detailed state-of-the-environment report on the St. Lawrence River.

F Environmental Partners Fund

Initiated in 1989, the Environmental Partners Fund is a five year, $50 million program designed to promote partnerships between local groups and the federal government. Through these partnerships, the federal government will continue its efforts towards protecting, enhancing and restoring the environment. The Government of Canada believes that every Canadian has a role to play in solving the complex pollution problems we face.

The Partners Fund provides matching funds for local environmental projects. These projects include:

- rehabilitating the natural environment;
- restoring fish and wildlife habitats;
- cleaning up lakes and streams, and conserving local water supplies; and
- reducing and recycling waste.

One of the criteria by which projects are selected is the development of partnerships. Applicants are encouraged to develop partnerships with supporting organizations which can provide the project with financial and other assistance.

Applications for the Fund are subject to administrative and technical reviews prior to being selected for funding. Reviews include screening by the following governmental departments: the Federal Departments of Environment, Fisheries and Oceans, Indian and Northern Affairs, the Ontario Ministries of the Environment and Natural Resources and local Conservation Authorities. In 1989, 14 applications were approved. During 1990, 14 applications were approved for funding in January, another 11 in June and nine more in September. The Ontario portion of the five-year Environmental Partners Fund is $8.8 million (22 per cent of the national program). Currently the Fund is involved in 48 projects in the Ontario Region. Of these, between 70 and 90 per cent are in Central and Southern Ontario.

G Canadian Healthy Communities Project

The Canadian Healthy Communities Project was established in 1988 to promote and co-ordinate the establishment of "healthy communities" across Canada. This project, with funding from Health and Welfare Canada, is a joint venture of the Canadian Institute of Planners (CIP), the Canadian Public Health Association (CPHA), and the Federation of Canadian Municipalities (FCM). The Project's national office will assist municipalities and their communities around the Great Lakes to pursue public policies and activities addressing health and environmental concerns.

H Contaminated Sites Cleanup

In October, 1989, the Canadian Council of Ministers of the Environment (CCME) established a new five year, $250 million program to ensure the cleanup of contaminated sites throughout Canada. Cleanup of contaminated sites is based on the "polluter pays" principle. There are, however, contaminated sites where neither those responsible for the contamination nor the owner of the property where the contamination originated are able to pay or are willing to pay within the time frame specified. For the cleanup of these high-risk "orphan sites", the CCME's program is based on a 50-50 federal-provincial cost-sharing formula. Attempts at recovering costs will be made at those sites where the polluter is at this time unwilling to pay. This program will provide $200 million for cleanup activities and $50 million to support decontamination technology development and demonstration.

The program will enable immediate action to be taken where the responsible party is unknown, cannot be identified or located, is insolvent, or is unwilling to implement a cleanup program in a timely manner. It deals with sites where contamination poses an existing or imminent threat to human health or the environment. There are an estimated 1000 high risk contaminated sites in Canada of which an estimated 50 are orphan sites.

The Department of National Health and Welfare is assisting with the assessment of health risks posed by those sites, the determination of health-based soil quality guidelines and methods to assess and classify sites according to possible health risks.

The Contaminated Sites program is based on the following principles:

- provinces will have necessary laws, regulations and programs in place to ensure cleanup of all high risk contaminated land sites where the responsible party can be held accountable consistent with the "polluter pays" principle;
- common site assessment, ranking, cleanup criteria and guidelines will be used to deal with orphan sites;
- governments will clean up sites where they are the responsible polluter; and
- each of the provinces and territories will have access to the federal portion of the program funding based on a per capita formula.

The Government of Canada and the Province of Ontario are negotiating the terms of their agreement and identifying candidate sites.

III. NEW PROVINCIAL INITIATIVES

A Ontario Round Table on Environment and Economy

The Round Table on Environment and Economy, comprised of 20 leaders from environmental organizations, industry, labour, agriculture, aboriginal groups, academia, provincial agencies and municipal governments was established in March, 1989, to develop a provincial strategy for sustainable development.

On July 27, 1990, the Round Table released its first report issuing a challenge to the people of Ontario to implement sustainable development in the province. In total, the report contains 69 directions for change, 35 suggested milestones/targets and over 100 examples of actions that are currently being taken by all sectors of the economy and that are consistent with the Round Table's six principles of sustainable development. Six sectoral task forces have been established to assist the Round Table in translating these principles into action:

- anticipation and prevention
- full cost accounting
- informed decision-making

- living off the interest (doing better with less)
- quality of development over quantity
- respect for nature and the rights of future generations

B Strategic Plan for Ontario Fisheries II

The Ontario Government, in consultation with the public, has designed a new Strategic Plan for Ontario Fisheries (SPOF II) for the 1990s and beyond. This document will serve as a blueprint for a province-wide course of action involving the public and private sectors.

Consultation with the people of Ontario was essential to the development of SPOF II. The Ontario Ministry of Natural Resources worked with representatives from key government agencies and interested client groups as well as the general public to revise the original Strategy. This further strengthens the Ministry's commitment to developing new partnerships. More than 11,000 copies of the draft Strategy were distributed, which resulted in many thoughtful responses from interest groups and the general public.

This plan will help protect healthy aquatic ecosystems and rehabilitate those that are now degraded. The overall goal, which is faithful to the concept of environmentally-sustainable economic development, is to have healthy aquatic ecosystems that provide long term benefits to help satisfy society's need for a high-quality environment, wholesome food, employment and income, recreational activity, and cultural heritage.

In addition to the goal statement, the following objectives were derived: protection of healthy ecosystems; rehabilitation of degraded aquatic ecosystems; and improvement of cultural, social and economic benefits from Ontario's fisheries resource. It is anticipated that the Strategic Plan will now proceed to Provincial Cabinet as a multi-agency submission involving seven provincial ministries with key responsibilities for the management of aquatic resources.

C Vehicle Emissions Strategy

The Ontario Ministry of the Environment is currently developing a comprehensive plan to control vehicle-related emissions through regulatory and educational programs. It has been estimated in Ontario (1985) that 26 per cent of the carbon dioxide, 64 per cent of the carbon monoxide, 63 per cent of the nitrogen oxides, 46 per cent of the volatile organic compounds and 64 per cent of benzene compounds were generated by mobile sources. These emissions are associated with such concerns as greenhouse gases, ground-level ozone, acid rain and airborne toxic emissions.

The proposed strategy to deal with these problems involves improved emissions control for cars and trucks, improved fuels and improved distribution systems. The Ontario Ministry of the Environment will be taking co-operative action with the Ontario Ministry of Transportation, as well as other provincial and federal agencies.

D Environmental Technology Program

The Environmental Technology Program, initiated in 1990, is designed to encourage Ontario organizations to take part in finding new ways to protect and improve the environment. This program will provide financial assistance to companies, universities and other groups to support the development of products and processes that will help reduce pollution and protect our land, water and air. Under this program, the Ontario Ministry of the Environment will spend $30 million over a five year period to provide up to 50 per cent of research and development costs. Funding preference under this program is toward projects that lead to commercial development that can be marketed both locally and globally.

Seven major categories of technologies, products and processes are eligible for funding:

- Tire Recycling;
- The 3Rs (Reduction, Reuse and Recycling);
- Waste Management;
- Analytical Instrumentation;
- Water and Sewage Treatment;
- Air Pollution Control; and
- Socio-Economic Analysis.

Organizations operating and residing in Ontario are eligible for funding under this program. Furthermore, federal and provincial agencies may participate as minor partners in joint ventures with the principal proponent.

Both direct and indirect project costs may be eligible, including supply and installation

of equipment; chemical analysis and performance monitoring; technology transfer and publication; and other costs deemed reasonable. Basic research costs are not eligible, unless small components of research are essential to the success of the project as a whole.

Applications for funding under the Environmental Technologies Program can be forwarded to the Research and Technology Branch of the Ontario Ministry of the Environment.

(E) Safe Drinking Water Act

The Ontario Ministry of the Environment is developing a Safe Drinking Water Act. This proposed Act will establish legally enforceable standards that require owners of drinking water systems to monitor for and report on drinking water contaminants. The SDWA will meet the public's request for additional enforceable water quality standards.

The scope of the Safe Drinking Water Act regulations will include drinking water inspection; treatment standards; inspection and monitoring of water supplies; design, construction, operation and maintenance of water treatment plants and water distribution systems; and training, education and certification for water treatment plant personnel.

(F) Watershed Management Planning Strategy

The Ontario Ministries of the Environment and Natural Resources are developing a Watershed Management Planning Strategy (WMPS) for Ontario stream and lake systems. The goals and approach of the Strategy support the integration of water resources planning with land use planning, surface water protection with groundwater protection, and prevention with remediation.

This Strategy focuses on the need for program co-ordination among provincial ministries and between the Province and municipal governments. Furthermore, it proposes formal recognition of key water management planning levels, together with strong linkages between water resources and land use planning and management processes.

IV. CITIZENS TAKING ACTION

The mandate conferred on Canada and the United States through the Great Lakes Water Quality Agreement is that of restoring and protecting the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem. Co-ordination of programs undertaken with this purpose in mind makes one thing clear: no government, no sector of society, is able to work in isolation. Thus it is important for the Government of Canada and the Province of Ontario to encourage the mobilization and integration of efforts from all sectors of society to do their share.

Under the Canada-Ontario Agreement, public participation in the Remedial Action Plan (RAP) process has been taken very seriously. With federal and provincial sponsorship, the RAP process has enabled a network of 400 citizens in 16 committees drawn from industry, public interest groups and the public at large to work on the development of Remedial Action Plans. There is also an extended network of several thousand citizens who wish to remain informed as RAPs develop and citizen representation on technical committees working on the Niagara River and Lake Ontario Toxics Management Plans. Public input into the development of binational chemical and ecosystem objectives for the Great Lakes, and the establishment of Strategic Advisory Committees for the Great Lakes Action Plan and for the Great Lakes Health Effects Program are further examples of public involvement.

The governments of Canada and Ontario acknowledge the efforts made by the many Non-Governmental Organizations (NGOs) and academic institutions. Over the past two years there have been several noteworthy publications addressing the Great Lakes that have helped to focus attention on issues that loom large in the minds of Basin residents. Some examples are:

- **An Environmental Strategy for Ontario: Draft for Public Review**, was released by the Conservation Council of Ontario in July, 1990, and presents a challenge to promote a co-ordinated response to the environmental and resource issues of the province. The aim of the strategy is to ensure that Ontario's economic and social development is environmentally sustainable. The report contains 169 recommendations for improving the

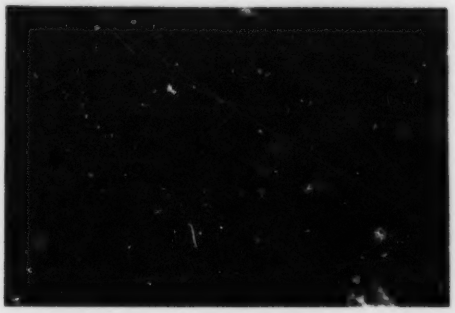
quality of the environment and creating environmentally sustainable economic and social development in Ontario.

- **Great Lakes, Great Legacy?** was authored jointly by The Institute for Research on Public Policy and The Conservation Foundation and was released in 1990. This comprehensive report examines the state of the Great Lakes, the history of contamination, past mistakes, the costs of environmental degradation and sets out principles for action.
- **The Great Lakes United** is a quarterly newsletter, published by Great Lakes United, that keeps the public informed about actions being taken within all sectors.
- **Towards an Ecosystem Charter for the Great Lakes-St. Lawrence** released in January, 1990, by The Rawson Academy of Aquatic Science, presents a proposed ecosystem charter for the Great Lakes and the St. Lawrence River. This charter proposes to provide an umbrella for binational Great Lakes agreements and decision-making.
- **Water for Life**, released in June, 1989, by Greenpeace, presents an ecological assessment of the Great Lakes. It details the experience gained during the "Beluga" boat tour organized in the summer of 1988, and documents over 36 hotspots between Saguenay, Quebec and Chicago, Illinois.
- **Watershed**, released in September, 1990, is the second interim report of the Royal Commission on the Future of the Toronto Waterfront. The report includes 80 recommendations based on the Commission's principles: "that the waterfront be clean, green, useable, diverse, open, accessible, connected, affordable and attractive".

V. INITIATIVES BY INDUSTRY

In order to document and acknowledge the various industry initiatives currently in place, Environment Canada and The Donner Canadian Foundation have provided funding to The Centre for the Great Lakes Foundation to produce a report, that in part, details such initiatives.

The Centre for the Great Lakes examined five economic sectors and conducted case



studies on each. Each sector was examined in terms of pollution abatement strategies currently in place and the economic impact on the Great Lakes Basin. Highlights of the case studies have been included here as a reference. The complete report is expected to be available through The Centre for the Great Lakes by mid-1991.

- **Pulp and Paper Sector - E.B. Eddy Products Ltd. of Espanola, Ontario (located directly on the Spanish River)**

  Since 1970, the mill has been struggling to find solutions to its environmental problems. In the early 1980s, the mill underwent a modernization program which included the installation of an oxygen delignification system and an end of pipe secondary treatment system for the total mill effluent. The oxygen delignification system is able to reduce chlorine consumption by 50 per cent and enables the mill to recover organic materials that were previously lost to sewers. Currently, E.B. Eddy is the only company in Canada to utilize this system in its bleach plant. Implementation of the process has peaked the interest of other companies. Most recently the mill has incorporated high substitution technology (chlorine dioxide substitution) in the mill's bleaching system.

- **Plastics and Synthetic Resins - Dow Chemical Canada, Sarnia Division**

  Over the past ten years Dow has decreased its water effluents to the St. Clair River from 1000 kilograms of identifiable organic compounds per day in the early 1980s to less than 10 kilograms per day in 1989. For the 1990s, the ten year goal of the Sarnia division is to have no uncontrolled releases to the St. Clair River.

- **Organic Chemicals - Du Pont of Canada**

  Du Pont of Canada has established a detailed environmental policy to reduce

effluents throughout all areas of the company. Programs are currently in place to reduce its total effluent levels to receiving waters, land and the atmosphere by 50 per cent by the year 2000, as well as eliminating the discharge of toxic chemicals by the year 1995.

- **Metal Finishing - Dofasco of Hamilton, Ontario**

  Since 1969, Dofasco has spent $600 million in its Hamilton plant on waste management systems concerning air, water and land. The company has estimated that they have reduced air and water poilution by 95 per cent while increasing production by 100 per cent. Furthermore, they have in place a recycling process which reduces 90 per cent of the company's waste slags.

  As part of its commitment to the environment, Dofasco has also been an active participant in the Hamilton Harbour Remedial Action Plan (RAP) for the past five years. In 1988, the company was acknowledged in the Remedial Action Plan Team's report for making consistent improvements over the past 12 years.

- **Aircraft and Aircraft Parts - Pratt and Whitney Canada Inc., of Longueuil, Quebec**

  Pratt and Whitney is developing a comprehensive environmental protection protocol with the Province of Quebec. Analysis of waste streams are being carried out and remedial plans are being developed.

  Two highlights of Pratt and Whitney abatement plans are its "Clean Water Program" and its use of "Best Management Practises" (BMP). The Clean Water Program consists of a number of projects designed to improve effluent quality. Its BMPs are aimed at achieving a more efficient use of water and a minimization of waste.

PROGRESS 1989-1990

This chapter highlights progress made in 1989 and 1990 in the areas of research, program development and cleanup of toxic substances in the Great Lakes basin. It is divided into three parts: Toxic Substances in the Great Lakes Basin, Ecosystem and Health, and Cleanup.

I. TOXIC SUBSTANCES IN THE GREAT LAKES BASIN

The Great Lakes Ecosystem is a contaminated ecosystem. Monitoring data collected since the early 1970s show that persistent toxic chemicals are present in water, air, sediments and biota, including humans.

The overall contamination of the Great Lakes, though lower than in the 1970s, is being maintained at current levels due to the resuspension of contaminated sediments, the deposition of airborne toxics, the slow leaching of contaminants from hazardous waste sites, and, possibly, runoff from historically contaminated agricultural land. The uncontrolled discharge from municipal sewage systems during rain storms and unregulated or accidental industrial releases also contribute to the problem. Surprisingly, in some cases, the atmospheric route is the major route of toxic chemicals into the Lakes. As a result, humans, fish and wildlife in the Great Lakes Basin Ecosystem will continue to be exposed to contaminants for some time to come.

A Air Toxics

Many toxic substances are carried into the Great Lakes by the atmosphere, as well as by local sources. They settle on land and are washed into the Lakes or they may enter the Lakes directly from the atmosphere or through precipitation. Annex 15 of the Great Lakes Water Quality Agreement calls for the creation of a surveillance network to acquire accurate information on the nature and amount of toxic substances entering the Lakes from the atmosphere, as well as the identification and control of emission sources. Since the publication of the First Report of Canada and in accordance with Annex 15, much work has been undertaken to understand and estimate atmospheric deposition of toxic substances into the Great Lakes Basin Ecosystem, with the objective of being able to reduce it. It can be described under three headings:

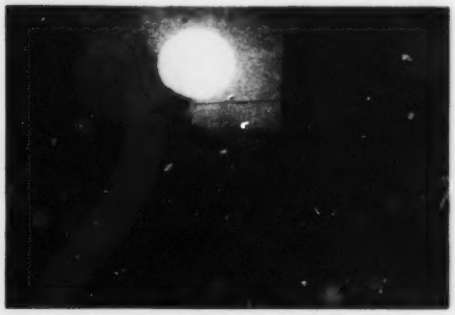
- **Research** is being conducted to determine pathways, the fate and effects of airborne toxic substances.

  As part of this research new techniques have been developed for measuring atmospheric turbulence, methodologies have been developed for a number of toxic substances, and programs have been developed to investigate air/soil and air/water exchanges.

- **Surveillance and Monitoring** is addressed by the Implementation Plan for the Integrated Atmospheric Deposition Network (IADN) which was signed by the Parties in June 1990. In addition to other monitoring programs, the Network will identify toxic substances present in the air and precipitation, and will also estimate their loadings to the Great Lakes Basin. The Implementation Plan provides details and specific directions that are to take place over the next six years. The first Canadian Master Station has been established at Point Petre and sampling activities have begun. This station provides a platform for many agencies to take simultaneous measurements of a number of substances.

- **Pollution Control Measures** are being developed, adopted and implemented

for cases when the atmospheric deposition of toxic substances contributes significantly to the pollution of the Great Lakes.



B Transboundary Airborne Pollutants

A variety of airborne pollutants have serious effects on the Great Lakes Ecosystem, and the Province of Ontario is involved with various programs, plans, strategies and agreements to deal with these problems. Some of the principal efforts are summarized in this section.

The passage of amendments to the U.S. Clean Air Act has made the Province's Countdown Acid Rain Program potentially much more meaningful as the problem will now be attacked on both sides of the international border. Emissions from the United States cause about 50 per cent of the acid deposition in Ontario, and without U.S. reductions the province could not meet environmentally acceptable deposition levels.

The Ontario Countdown Acid Rain Program is on track. The four major stationary sources (which collectively account for about 80 per cent of sulphur dioxide emissions in Ontario) have now met implementation requirements to report and have now verified sulphur dioxide (plus nitrogen oxide for Ontario Hydro) emissions. While related issues need resolution, the province's cap on its sulphur dioxide emissions at 885 kilotonnes per year by 1994 will be met.

At the federal-provincial and international levels, Ontario is continuing to participate in and monitor air quality problems caused by carbon dioxide and nitrogen oxide/volatile organic compound emissions. A number of air quality monitoring and abatement measures have been proposed in the province's draft Clean Air Program and Vehicle Emissions Strategy.

C Contaminated Sediments

While the problem of contaminated sediments has been acknowledged for some time, the federal government under the Great Lakes Action Plan (GLAP) is implementing two programs to address this pollution source.

First, as part of the Preservation Program, the federal government is reviewing practices in Canada and the United States regarding the classification of contaminated sediments. The federal government is also exchanging information with the U.S. regarding dredging technology and the mapping, assessment and management of contaminated sediments. It is also encouraging research on advances in dredging and pathways, fate, and effects of nutrients and contaminants in dredged materials. A report has been completed which evaluates the state of all confined disposal facilities, built to contain dredged sediments, on the Canadian side of the Great Lakes. Recommendations for the management of these facilities have been prepared. Field tests using plant and animal tissue samples are continuing in order to determine the long term environmental effects generated by these facilities.

Second, the Cleanup Fund is addressing the problem of contaminated sediments in Areas of Concern. The Fund is focusing on three areas: removal of contaminated sediments, treatment of contaminated sediments, and treatment technologies. Removal and treatment technologies are being assessed while geological sediment criteria will be developed and applied by Canada in the assessment of dredged spoils and the cleanup of contaminated sediments.

The Province of Ontario has prepared and is presently reviewing draft Sediment Quality Guidelines. The provincial government is also preparing a detailed assessment on the province-wide implications of applying these guidelines as part of the policy approval process. The guidelines will form one component of a provincial management strategy. The identification of zones of contamination has begun in Hamilton Harbour, Thunder Bay, the Bay of Quinte and the St. Lawrence River and other Areas of Concern in conjunction with the federal/provincial Remedial Action Plan (RAP) program. The provincial Environmental Technologies Program is involved in cost-sharing sediment treatment technology projects. It is anticipated that actual cleanup of specific areas will be initiated. Projects will be based on priorities reflected in RAPs for

particular Areas of Concern. The Canada-Ontario Agreement's RAP Steering Committee has created a Sediment Task Force to assist in the implementation of sediment-related management options in Areas of Concern.

D Groundwater

Groundwater, which reappears as river flow contaminated by the widespread application of agricultural chemicals and seepage from contaminated sites such as municipal and industrial dumps, can be a significant source of pollution to the Great Lakes. In particular, groundwater contamination has been identified as a concern in the Areas of Concern throughout the Great Lakes Basin. A survey has been conducted of the 17 AOCs in Ontario to determine the likelihood of this contamination. Results will be compiled and presented next year.

Federal programs related to groundwater are directed at the increased understanding of hydrogeological processes through research, and the development of national inventories of the resource. As part of the Great Lakes Action Plan, resources are being directed towards groundwater issues. Major sources of special concern are under investigation in the vicinity of the Niagara and St. Clair Rivers.

Provincial programs are focused on the protection of the groundwater resource itself.

E Pesticides/Non-Point Pollution

Canada and the Province of Ontario have implemented several regulatory programs and measures for the abatement and reduction of non-point source inputs of phosphorus, sediments, toxic substances, and microbiological contaminants contained in drainage from urban and rural land, including waste disposal sites, in the Great Lakes System. Among the programs initiated are:

- **The Ontario Ministry of Agriculture and Food's (OMAF) Food Systems 2002 Program**

  The objectives of this program are to maintain efficient and sustainable crop production through the development of environmentally-sound techniques and to help increase grower awareness while decreasing grower costs and the pesticide load in the environment.

- **Regulation 751 of the Ontario Pesticides Act**

  The Ontario Ministry of the Environment has made changes to Regulation 751 in order to ensure more stringent requirements for the sale, use, storage and transportation of pesticides in Ontario. There is currently a review of the Canadian pesticide registration process being undertaken by the Federal Department of Agriculture.

- **The Land Stewardship Program of the Ontario Ministry of Agriculture and Food.**

  This program was initiated in 1987, and was in place for a period of three years, expiring in August 1990. The program provided financial incentives for the adoption of conservation farming practices on farmland in Ontario to improve soil resources and water management by minimizing the potential environmental contamination from agricultural practices. The program resulted in increased financially-assisted erosion protection of agricultural soils on an average of 107,000 hectares annually in the Great Lakes Basin.

- **The Rural Beaches Program**

  This program was introduced by the Ontario Ministry of the Environment in 1985 and is currently in its sixth year. A total of $1 million has been contributed to the program during 1989 and 1990. The program provides funding to Conservation Authorities for the investigation of specific beach problems and the development of Clean Up Rural

Beaches (CURB) Plans. The CURB Plans identify rural non-point sources of bacterial contamination which are impacting on rural beaches.

- **The Soil and Water Environmental Enhancement Program (SWEEP)**

  The program was initiated in 1985 as a component of the Canadian federal-provincial Phosphorus Load Reduction Plan. A major goal of the program is to reduce phosphorus loadings by 200 tonnes per year in the Lake Erie Basin from agricultural non-point sources.

F Virtual Elimination and Zero Discharge

Faced with the situation of persistent toxic substances in the Great Lakes Ecosystem, the governments of Canada and the United States concluded that the only course of action was to adopt a policy of virtual elimination of the discharge of these substances to the environment. Furthermore, they concluded that pollution control programs should incorporate into their design the philosophy of zero pollutants added to the discharge. This principle was later established by the two governments when the 1978 Great Lakes Water Quality Agreement was signed, and further confirmed in the 1987 Protocol.

The Government of Canada reaffirmed this policy by adopting virtual elimination as a national goal in its Green Plan. To achieve virtual elimination, the Green Plan commits Canada to work with the United States on the development of a bilateral action plan for comprehensive pollution prevention in the Great Lakes Basin. The federal government will also commit funding for technology demonstration and community education projects to support pollution prevention action plans.

The Ontario Ministry of the Environment has in place a strong regulatory process involving control orders, certificates of approval and inspection and prosecution mechanisms. The purpose of the Municipal-Industrial Strategy for Abatement (MISA) is to regulate the discharge of both persistent toxic chemicals and conventional substances from effluents to the point where they are virtually eliminated from the environment.

Discussions are under way with the U.S. Environmental Protection Agency on specific programs to address the issues of zero discharge and virtual elimination for Lake Superior.

II. ECOSYSTEM AND HEALTH

The Great Lakes Water Quality Agreement commits the Parties to the development of specific chemical and ecosystem objectives. Specific objectives represent minimum levels of water quality desired in the boundary waters of the Great Lakes in order to achieve the level of environmental quality identified in the Agreement. Specific objectives are intended to be protective of the most sensitive species within the Great Lakes. These specific objectives do not preclude the establishment of more stringent requirements. However, there are many factors that affect the health of ecosystems and specific objectives are limited to the impact of individual substances on particular species in the environment.

Laboratory and field studies of fish and wildlife have established that many of the chemicals present in the Great Lakes Basin, coupled with non-chemical factors, can cause adverse health effects in a wide range of animal species. The interaction of these factors is even more complex in humans. While it is difficult to establish that exposure to a particular environmental chemical caused a particular effect in fish, wildlife or humans, it is common for researchers to identify associations between exposure and effects.

There remains the question of whether the health of people living in the Great Lakes Basin Ecosystem is affected by their continued exposure to persistent toxic substances. There is a general consensus that sustained exposure of humans to relatively high levels of persistent toxic chemicals poses a threat to health. The precise nature and extent of the threat to populations in the Great Lakes Basin is uncertain.

The most thorough study of subtle adverse effects in the Great Lakes Basin to date has shown that there are adverse effects in the children of women who ate fish from Lake Michigan. These findings are preliminary and require confirmation. However, they are consistent with the results of wildlife and laboratory animal studies. It is likely that there are people who are at greater risk than

average because they are heavily exposed (e.g. nursing infants and those people who eat large amounts of contaminated fish such as native peoples and some sports fishermen) or are more susceptible (e.g. the developing fetus, newborns, the elderly and those who are in poor health). Lack of full scientific understanding of the behaviour of persistent toxic chemicals in the environment and their modes of action within an organism raises the possibilities that there may yet be new me. ns of exposure and undiscovered adverse effects.

If we are to provide the best possible protection for human populations from the effects of contaminant exposure, we must achieve three goals: 1) we must reduce environmental loadings and remediate contaminated areas; 2) we must understand the nature and extent of the threats to health and provide the public with the means to reduce the risk to their health, and 3) we must empower individuals to take steps to reduce their own and their families' exposures. By seeing ourselves as a part of the ecosystem versus apart (separate) from the ecosystem we will become part of the solution. Health and environment are truly partners for life.

This section describes the development of ecosystem objectives and chemical objectives; the impact of zebra mussels, other exotic species and spills; the issue of wetlands; and the importance of surveillance and monitoring.

A Ecosystem Objectives

Annex 1 of the amended Great Lakes Water Quality Agreement calls for the development of specific ecosystem objectives jointly by Canada and the United States, and in consultation with state and provincial governments and the public. By identifying desired ecological attributes, ecosystem objectives will provide comprehensive and integrated measures of ecosystem health. To respond to the Agreement requirements, the Parties established the Binational Objectives Development Committee (BODC). In turn, the BODC established the Ecosystem Objectives Work Group.

The initial focus of the binational Ecosystem Objectives Work Group was on developing ecosystem objectives for Lake Ontario in conjunction with the Lake Ontario Toxics Management Plan. The development of ecosystem objectives for Lake Ontario has three components. The first is a statement of goals, which reflect societal values in and around Lake Ontario. The second is a set of ecosystem objectives for various components of the ecosystem that would ensure attainment of these goals. Finally, one or more indicators, which must be measurable and quantitative, will be selected for measuring progress towards each objective.

Public Consultation for Ecosystem Objectives:

The public has been involved in these activities through multi-stakeholder workshops. In March, 1990, workshop participants representing fishing interests, industry, academia, government and environmental groups, developed three goals and five ecosystem objectives for Lake Ontario. As work proceeds, participation from these sectors and from the public at large will be continually invited. For example, public consultation workshops will be held in 1991 to identify conditions that would indicate a healthy ecosystem for Lake Ontario. The next task is to determine measurable indicators for the five ecosystem objectives: aquatic communities, wildlife, human health, habitat and stewardship. Ecosystem objective workshops are being planned in 1991 for the other Great Lakes.

B Chemical Objectives

Also falling into the category of objectives development is the task of establishing standard methods for evaluating chemicals so that they can be classified and placed on the appropriate priority list within the Great Lakes Water Quality Agreement. The Chemical Objectives Work Group, established under the Binational Objectives Development Committee, has made considerable progress in fulfilling these requirements.

Through consultation and co-operation, the Parties have developed Standard Methods for the compilation and maintenance of lists of substances. These Standard Methods, which have been reviewed by the public, determine those substances believed to be present in, or which have the potential of being discharged to, the Great Lakes system. The Standard Methods take into consideration short term and long term effects, the potential to cause cancer, birth defects, and changes in genetic composition, bioaccumulation and environmental persistence. The 1989 Annex 1 List No. 1, which will be reviewed and updated annually, consists of 162 compounds believed to be present and toxic. The Great Lakes Water Quality Agreement sets specific objectives limiting concentration in lake water for 57 of these 162 compounds. The remaining 105 compounds will be the focus of recommendations for the incorporation of new or modified specific objectives into the Agreement.

Environmental and health agencies within the Great Lakes Basin operate under different mandates and legislation, hence there are a variety of guidelines, criteria, objectives, rules and standards being used by the various Great Lakes jurisdictions. It was considered necessary to develop a "Protocol for the Review and Adoption of Chemical Specific Objectives for the Great Lakes Water Quality Agreement". This protocol, which is currently under development, outlines the minimum qualifying requirements that must be met for an agency's objective to be considered for adoption as a Specific Objective under the Great Lakes Water Quality Agreement. The process of recommending Specific Objectives for chemicals in the Great Lakes will begin in 1991, once a consensus for this protocol is reached and after public review is completed.

Public Consultation for Chemical Objectives

The public in the Great Lakes often voices the view that water quality objectives should be the same throughout all Great Lakes jurisdictions. The Great Lakes Water Quality Agreement acknowledges the wisdom in this view, as well as the difficulties in bringing about harmonized standards.

Standard Methods (1989), a proposed draft for the establishment of standard methods for evaluating chemicals for classification into appropriate priority lists, and Annex 1 List of Substances (1989), an example of the first priority list involving chemicals considered present and toxic, were circulated widely among interested groups in 1990, but elicited little feedback. Some respondents cited the complex technical nature of the document as an impediment. The document was revised as a result of this feedback and will be made available in the spring of 1991.

Public review of a protocol for the review and adoption of chemical specific objectives for the Great Lakes Water Quality Agreement will take place after the agencies involved in drafting it have reached consensus. Once the protocol is in place, the process of recommending specific binational objectives will begin.

C Zebra Mussels

The zebra mussel, a one to five centimetre freshwater mussel native to Europe, gained access to the Great Lakes in the ballast water of trans-Atlantic ships. They were first reported in Lake St. Clair in 1986. By 1989 they had colonized all of the available shallow water habitat in Lake St. Clair and western Lake Erie. They have now been found in isolated pockets in all of the Great Lakes.

Distribution has been facilitated by the high reproductive capacity of the mussel and the large amount of inter-lake shipping. Mussels spawn at two years of age, releasing 30,000-40,000 eggs per female. The eggs hatch in two to three days into free swimming larvae that may be transported hundreds of kilometres by lake currents. By the end of the first year, the mussel has developed strong byssal threads which attach firmly to rocks and other hard surfaces including metal, plastic, rubber and wood. Mussels can accumulate several layers deep on rocky reefs, navigation buoys, gas wells and water intake pipes. Populations as high as 700,000 per square metre have been reported in western Lake Erie. Although fish and diving ducks are now feeding on mussels in Lake Erie, there is no indication that populations have stabilized or started to decline.

Despite the fact that mussels are present in isolated areas in all of the Lakes, low calcium concentrations and cooler temperatures of the Upper Lakes will probably limit distribution and growth. In an effort to prevent access to the inland lakes, the Government of Ontario has instructed boat owners and fishermen to remove mussels from boats and bait containers. However, young mussels are almost invisible to the naked eye and it is probable that mussels will spread to all shallow, warm and eutrophic lakes including the Muskoka and Kawartha Lakes. Since mussels require high calcium levels in order to flourish, they are not expected to become a

major problem in the soft water lakes of the Canadian Shield, which are low in calcium.

In western Lake Erie, large populations of zebra mussels have colonized municipal and industrial water intake pipes resulting in flow reduction, putrefaction, methane production, and corrosion of steel and cast pipes. It is estimated that the economic impact will exceed hundreds of millions of dollars. The most common method of control involves the periodic treatment of intakes with chlorine to kill larvae and adults.

The ecological impacts of zebra mussels are still being determined. On the positive side, there may be a significant increase in nearshore water clarity due to the enormous volume of water that is filtered by the entire mussel population. On the other hand, mussels sometimes build up on crayfish and clams, impeding their mobility and eventually killing them. Heavy infestations of mussels have covered the spawning shoals of shallow water fish in Lake Erie, altering their physical and biological characteristics and threatening important commercial species such as walleye. Similar problems could occur on the spawning shoals of Lake Ontario whitefish and lake trout. In addition, waterfowl are feeding on the mussel and remaining in the Point Pelee area in large numbers. This has led to a change in waterfowl migration patterns, which may be expected to occur in other areas of the Great Lakes.

The implementation of programs to reduce the damage caused by zebra mussels will require co-operative binational programs. Federal and provincial representatives met with U.S. colleagues in Washington in October, 1990, to discuss the problem. It was agreed that there are several areas where co-operation and joint initiatives on zebra mussels were warranted, including:

- convening a binational workshop of researchers to review findings and progress;
- sharing of European (translated) literature;
- cataloguing of research projects; and
- developing joint studies where needed.

Under consideration is the establishment of a bilateral co-ordinating committee to oversee and develop the above activities.

Zebra mussels are here to stay and are now part of the Great Lakes Ecosystem. The impact of zebra mussels will vary greatly in the different conditions of the Lakes, but it appears that elimination of the pest is not possible and we can only hope to limit its damage. Further insight into the life requirements of the zebra mussel is necessary in order to understand how to deal with the problem.

(D) Accidental Introductions of Other Exotic Species

In 1988, the Great Lakes Fishery Commission reported that three non-native species had been introduced into the Great Lakes: the European river ruffe, the spiny water flea and the zebra mussel. Their source was strongly suspected to be ballast water discharge from visiting cargo ships. As a result, in April, 1989, the Canadian Coast Guard introduced controls for ballast water from ships visiting the Great Lakes. These controls, in a revised form, have been applied ever since. This step was seen as reducing the possibility that other non-native species could be discharged and disrupt the normal functioning of the Great Lakes Ecosystem.

In May, 1990, the Department of Fisheries and Oceans, Environment Canada and the Canadian Coast Guard jointly funded a Great Lakes ballast water study. The study monitors ship compliance with the ballast water exchange guidelines and tests the effectiveness of open ocean water exchange in reducing the accidental introduction of foreign organisms. It is anticipated that results from this study will be available by mid-1991. This work was initiated from recommendations resulting from a ballast water workshop co-convened by the International Joint Commission and the Great Lakes Fishery Commission.

The International Joint Commission and the Great Lakes Fishery Commission released a report in September, 1990, entitled, **Exotic Species and the Shipping Industry: The Great Lakes-St. Lawrence Ecosystem at Risk**. Official responses to the recommendations from this report are tabulated (in Appendix 2) following the responses to the recommendations from the **Fourth** and **Fifth Biennial Reports** of the IJC.

(E) Spills

During the two year period since the publication of the **First Report of Canada**, the Canadian Coast Guard has continued to administer programs aimed at eliminating pollution of the Great Lakes by shipping activities. Pollution from shipping represents a small but significant contribution to the

amount of pollutants entering the Great Lakes. Regulatory inspection of ships and enforcement of pollution prevention regulations, coupled with a system of aerial surveillance by a dedicated Coast Guard fixed wing aircraft, serve to minimize operational and intentional discharges.

The Canadian Coast Guard works co-operatively with its United States counterpart in applying regulations and other measures aimed at protecting the Great Lakes from pollution resulting from shipping activities. As part of the Great Lakes Water Quality Agreement, joint Canada/United States Coast Guard oil spill exercises figure prominently in the application and development of a Joint Contingency Plan. Annual meetings between the two Coast Guards are held to review progress in meeting the objectives of the Great Lakes Water Quality Agreement. Reports from the joint meetings are submitted to the IJC.

The Province of Ontario's Spill Contingency Plan provides a mechanism to deal with major spills under provincial jurisdiction which threaten the environment and to assist the Canadian Coast Guard when requested. The Ontario Ministry of the Environment's primary role in spill incidents is that of a regulatory agency enforcing the duties and provisions imposed by the Ontario Environmental Protection Act. When notified of a spill, the Ministry will assist in warning "downstream" users or potentially affected parties and other agencies where applicable. The Ontario Ministry of the Environment also developed a preventative strategy which requires targeted industries to implement spill reduction programs by February 1, 1992.

The 1989 grounding of the tanker Exxon Valdez, in Alaska, and the subsequent disastrous oil spill, alerted Canadians to the dire consequences of a major tanker accident within the Great Lakes. While vessels using the Great Lakes are restricted in size to a fraction of that of the Exxon Valdez, the enclosed fresh water nature of the Lakes and their use by many millions of citizens would make any large tanker oil spill a very serious event. Recognizing that fact, a Public Review Panel on Tanker Safety and Marine Spills Response Capability was struck and hearings were held across Canada. In November, 1990, the Public Review Panel released its report, **Protecting Our Waters.** The federal government has established an implementation team to review the recommendations of this report and to decide on an appropriate course of action.

The Canadian Coast Guard takes pride in its mandate to protect the Great Lakes from ship-source pollution and will continue to work co-operatively with its United States counterpart in the achievement of this goal.

F Wetlands

Extensive shoreline and riverine wetlands occur in the Great Lakes Basin and along the St. Lawrence River. Wetlands play a critical role in maintaining the health and dynamics of the Great Lakes Basin Ecosystem. Hydrological benefits include flood control and shoreline stabilization. Wetlands help to protect water quality by filtering nutrients and toxins from the surface runoff and can help prevent eutrophication. They provide critical habitat for flora and fauna, including some endangered species. As breeding grounds for fish, waterfowl and furbearers, wetlands represent a source of economic benefit. Some examples of important wetlands in the Great Lakes Basin include Walpole Island, Long Point and the mouth of the Grand River. Marshes at the mouth of the Grand River are being evaluated for possible acquisition.

Many wetlands in the Great Lakes system have disappeared over the years through urban encroachment, land drainage and filling. Annex 13 of the Great Lakes Water Quality Agreement requires that wetland areas which are threatened be identified, preserved and, where possible, rehabilitated. Annex 7 of the Agreement also states that the Parties (Canada and the United States) "direct particular attention to the identification and preservation of significant wetland areas in the Great Lakes Basin Ecosystem which are threatened by dredging and disposal activities".

The goal of the Ontario Ministry of Natural Resources' Wetland Management Program is to ensure the protection of wetlands across the province. The Department of Fisheries

and Oceans and the Ontario Ministry of Natural Resources have been working closely together for the past three years to protect wetlands that serve as fish habitat. Ontario has inventoried and categorized wetlands, and provides the advice necessary for the Department of Fisheries and Oceans to take the appropriate regulatory decisions using the Fisheries Act and the 1986 Policy for the Management of Fish Habitat.

The Canadian Wildlife Service of Environment Canada, in partnership with the Ontario Ministry of Natural Resources, is leading the implementation of the North American Waterfowl Management Program with assistance from Ducks Unlimited Canada, Wildlife Habitat Canada and the Nature Conservancy of Canada. Wetland projects include:

- **North American Waterfowl Management Program (NAWMP)**

  This multisectoral co-operation program is working to protect vast areas of wetlands and habitat essential to migratory waterfowl in Canada and the United States. The Eastern Habitats Joint Venture under NAWMP will focus on securing, restoring or enhancing thousands of hectares of Great Lakes wetlands in Ontario for the benefit of waterfowl and other wetlands species.

- **Canadian Wildlife Service**

  Canadian Wildlife Service (Ontario Region) is presently in the process of hiring a wetland biologist specifically to address wetland annex issues.

- **Wetlands at Risk**

  Environment Canada is involved in a number of monitoring and surveillance projects related to wetlands. A major initiative is the "Wetlands At Risk" project which identifies wetlands that are at risk from toxic chemical stresses from urban and agricultural sources, and studies the impacts of fluctuating Great Lakes water levels on shore zone wetlands.

Greater emphasis will be put on Great Lakes wetlands both in identifying beneficial use impairment (loss of fish and wildlife habitat), and in developing and implementing strategies for securement and remediation. Both urban and agricultural impacts on the wetlands of the Great Lakes Basin have caused loss of habitat.

Illegal destruction of wetlands is severely dealt with in the courts, and restoration of wetlands is sought through legal proceedings. In a proactive mode, all development proposals that may impact wetlands are carefully reviewed. The Department of Fisheries and Oceans and the Ontario Ministry of Natural Resources require that changes be made to site-specific development plans to ensure wetland protection.

Environment Canada has also undertaken monitoring activities in conjunction with the Ontario Ministry of Natural Resources to determine the presence of herbicides (atrazine and metolachlor) in wetlands associated with Rondeau Harbour and the Big Creek National Wildlife Area.

G Surveillance and Monitoring

Monitoring the overall health of the Great Lakes aquatic ecosystem is a major function of the Canada-Ontario Agreement. The surveillance program serves to investigate areas of water quality degradation and evaluates the impact of contaminants on the Great Lakes aquatic ecosystem. The program measures the effectiveness of cleanup efforts, warns of emerging problems and investigates sources of contamination. These activities fulfil Canada's commitment to Annex 11 of the Canada-United States Great Lakes Water Quality Agreement.

Under COA, surveillance of nearshore areas is carried out by the Ontario Ministry of the Environment.

During the last two years, provincial surveillance and monitoring activities have been oriented largely to support the development of Remedial Action Plans for Areas of Concern, pursuant to Annex 2. The Province has conducted a number of field studies to update knowledge of environmental conditions, and to identify associated impaired uses and pollution sources for the completion of Stage I reports for the 17 Canadian Areas of Concern. Assessments, such as sediment and invertebrate surveys, are conducted to provide necessary information on biological impacts before recommendations for remedial measures can be made. Other sampling programs are carried out in order to develop appropriate remedial options and surveillance plans for

implementation and to track the effectiveness of remedial measures.

The province also conducts site-specific studies throughout the Great Lakes nearshore areas to report on environmental conditions, to assess compliance, to identify emerging problems or to define baseline conditions. Baseline conditions need to be established for monitoring changes in water, sediment and biota quality associated with anticipated future developments in some areas. Data are also required to monitor localized impacts from land based activities and to recommend abatement. Follow-up investigations are often warranted to assess the response to specific controls.

Each year the province conducts Basin-wide monitoring and surveillance programs. In 1989 and 1990, a number of long term surveillance projects were maintained by the Ontario Ministry of the Environment to monitor nutrients, metals and organic contaminants in water, sediment and biota. These programs are designed to determine Basin-wide effects of regulatory control programs and to evaluate water quality trends.

Computer modelling is a tool used with increasing frequency by the province. Toxic contaminant models are used for problem definition and evaluation of future conditions. They are also used to evaluate the effectiveness of proposed remedial options to alleviate existing water use impairments. Modelling also aids in the design of new intake and outfall configurations to prevent water use impairments.

Offshore studies are the responsibility of Environment Canada and the Department of Fisheries and Oceans. These agencies conduct open water surveillance and fisheries research. They assess the state and trends in the overall health of the Lakes measuring a variety of physical, chemical and biological parameters.

III. CLEANUP

This section addresses ongoing cleanup initiatives within the Great Lakes Basin. Many of these initiatives involve the co-operative efforts of all levels of government, non-government organizations and concerned citizens.

It is becoming increasingly obvious that, while cleanup is the ultimate goal of these programs, efforts also need to be directed towards conservation and protection. The Remedial Action Plan program, for instance, is concentrating efforts not only on remediating Areas of Concern but also on examining alternatives to end-of-pipe solutions, water conservation, public education and awareness.

The success of these programs will depend on the demand for cleanup and the level of public involvement. We must all continue to participate and take responsibility for the cleanup, restoration and preservation of damaged areas.

A Remedial Action Plans

In 1985, the IJC's Great Lakes Water Quality Board identified 42 Areas of Concern (AOC) around the Great Lakes. Of these, there are 17 areas located in Canada, including 12 which are in Canadian waters and five which are shared with the United States on connecting river systems (see Map of Great Lakes Areas of Concern). A 43rd site, Presque Isle Bay in Pennsylvania, has been proposed for designation as an AOC.

Subsequent to the Board's 1985 report, Canada and Ontario committed themselves under the Canada-Ontario Agreement Respecting Great Lakes Water Quality to joint development and implementation of Remedial Action Plans (RAPs) for the Canadian Areas of Concern. RAPs are being developed by 17 RAP Teams, composed of representatives of federal and provincial agencies, under the direction of a COA RAP Steering Committee and in close consultation with the public. (Please refer to the illustration "Remedial Action Plans: The Process").

Canadian RAPs are being developed in conformity with provisions of the Great Lakes Water Quality Agreement, notably the principles and procedures specified in Annex 2. The COA RAP program emphasizes adoption of a systematic and comprehensive ecosystem approach to restoring and

protecting beneficial uses and the area's ability to support aquatic life. An operational definition of the ecosystem approach has been developed by the RAP Steering Committee to guide RAP Teams in development. Particular attention has been given to ensuring that the public is consulted on all aspects of the RAP program. Guidelines for public involvement were developed and implemented early in the program and local Public Advisory Committees were established to provide input to the plans and to generate community awareness and support for the plans. This awareness and support will be critical for successful implementation of RAPs.

The RAP Steering Committee has commenced a number of program-wide initiatives to support the development of RAPs and the transition to implementation. A working group has developed draft Principles for Delisting Canadian Areas of Concern. These draft Principles are under public review and will provide the policy basis, along with guidelines prepared by the IJC, for development of delisting indicators for each Area of Concern. The indicators are to be developed in consultation with the local public and included in the RAP document. A Sediment Task Force has been established to assist RAP Teams in developing comprehensive contaminated sediment management strategies.

The Ontario Ministry of the Environment has completed an inventory of provincial government programs which may be utilized in RAP implementation and the Steering Committee has commissioned studies of existing and alternative mechanisms by which RAP implementation may be funded and of the current statutory and regulatory basis for RAP implementation. Environment Canada and the Ontario Ministry of the Environment have provided a commitment that public involvement will be continued in the implementation phase of RAPs and are exploring organizational structures whereby ongoing public accountability for implementation will be assured.

The COA RAP Program is unique in its emphasis on multi-disciplinary and multi-agency co-operation in the design and conduct of technical investigations. Some eight federal and provincial agencies are currently represented on the RAP Teams and/or involved in research to support Remedial Action Plans. In addition to Environment Canada and the Ontario Ministry of the Environment, other active agencies include the Federal Departments of Fisheries and Oceans, Agriculture, and Health and Welfare Canada and the Provincial Ministries of Natural Resources, Agriculture and Food, and various conservation authorities. The provision of additional support to federal agencies under the Preservation Fund component of the Great Lakes Action Plan has significantly enhanced the technical work effort in support of RAPs. Federal agencies are supporting approximately 40 technical studies at a cost of about $1.6 million in fiscal year 1990/91. The Ontario Ministry of the Environment is supporting approximately 40 technical studies costing $1.4 million in 1990/91. These investigations are essential to provide a sound scientific basis for the selection of remedial actions involving large expenditures of public and private funds.

In addition to ongoing technical studies, considerable progress has been made in implementing those remedial actions which have clear local support and which can commence immediately. Many of these actions have occurred as an outcome of ongoing public infrastructure development programs or as a component of industrial investment and operational plans. Examples include Windermere Basin Dredging (in progress) and the Toronto Eastern Beaches Retention Tank (in progress).

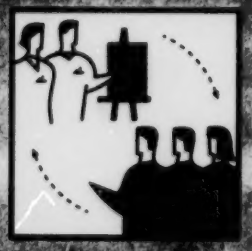
The Cleanup Fund component of the federal Great Lakes Action Plan commenced project funding in 1990. For fiscal year 1990/91 nineteen projects, valued at $4.6 million, have been approved in Areas of Concern. The Cleanup Fund also sponsored an international technical workshop in 1990 on urban non-point controls to encourage an exchange of information and views in this critical area.

During 1989 and 1990, twelve Stage I documents were submitted in draft to the RAP Steering Committee, with six final documents subsequently submitted to the IJC for review. It is expected that all remaining Stage I reports will be submitted in 1991 (Table A). Current schedules show three

Remedial Action Plans: The Process

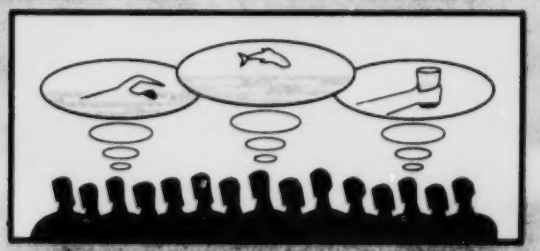
The Governments of Canada and Ontario are working with the public to restore water quality in severly polluted areas of the Great Lakes. They are developing Remedial Action Plans. Here's how:

[illegible] Areas of Concern [illegible] Canadian portion of the Great Lakes Basin.



Teams of scientific and technical staff are being joined by residents or "stakeholders" in the local Areas of Concern. Together they are developing Remedial Action Plans or RAPs.

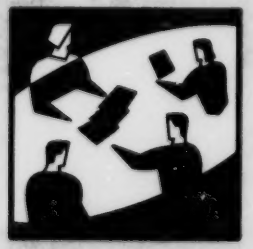
Public advisory committees are meeting regularly to ensure the public's views are accounted for in the RAP. Included are people from municipal governments; industry; public interest groups; academics and the public at large.



The public advisory committee determines what it sees as the community's goals for use of the water.

Statements of Environmental Conditions and Problem Definition

The RAP Team pute together all available information (from agencies and the public) into a draft statement of environmental conditions and problems.



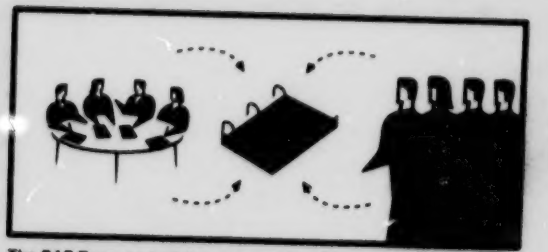
The draft is circulated among advisory committee members, interested citizens and government agencies for their comments.

The comments form part of the publicly released report which goes to the International Joint Commission charged with reviewing and commenting on RAPs.

Identification of Options
Selection of Remedial Actions

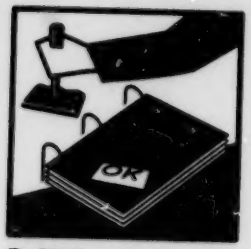
The RAP Team puts together all available information on possible actions to meet water use goals.

The team circulates this document to all interested parties, seeking additional options and comments.



The RAP Team and advisory committee develop and apply criteria leading to the selection of preferred actions. The RAP Team describes preferred actions in a report which becomes the focus of broad public discussion in the community.

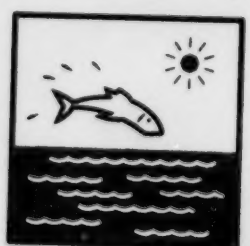
Implementation



The RAP Team uses the results of this public discussion to make appropriate changes and then recommends endorsement of the Remedial Action Plan.

Once the Plan is endorsed, action is sought from a wide range of responsible parties including industry, citizens and all levels of government. Environment Canada and the Ontario Ministry of the Environment play a lead role in ensuring that actions are implemented. The local public monitors and comments on progress in implementation of the Plan.

Restored Water Quality



Stage three is attained when monitoring shows that beneficial uses of the water body have been restored.

Stage II documents being submitted in 1991, the remainder in 1992. These schedules represent some slippage in relation to those presented in the **First Report of Canada** (1988).

Although Canada and Ontario are committed to expeditious development of RAPs, the need to ensure proper opportunity for public involvement and to ensure provision of a sound technical basis for decisions will ultimately determine schedules. The target dates for submission of Stage II documents (Table A) are largely dependent on the willingness of responsible parties to reach a timely consensus on action. Achieving timely consensus, commitment and funding will be the primary challenges during Stage II development.

TABLE A

Canadian Areas of Concern
ANTICIPATED SCHEDULE OF SUBMISSIONS OF REMEDIAL ACTION PLANS TO THE INTERNATIONAL JOINT COMMISSION

Area of Concern:	Stage I	Stage II
Thunder Bay	(3 Qtr 91)	(4 Qtr 92)
Nipigon Bay	(3 Qtr 91)	(4 Qtr 92)
Jackfish Bay	(3 Qtr 91)	(4 Qtr 92)
Peninsula Harbour	(3 Qtr 91)	(4 Qtr 92)
St. Marys River	(4 Qtr 91)	being determined
Spanish River	(3 Qtr 91)	(4 Qtr 92)
Severn Sound	May 89	(2 Qtr 92)
Collingwood Harbour	May 89	(2 Qtr 92)
St. Clair River	(4 Qtr 91)	being determined
Detroit River	(3 Qtr 91)	being determined
Wheatley Harbour	(3 Qtr 91)	(1 Qtr 92)
Niagara River	(3 Qtr 91)	(4 Qtr 92)
Hamilton Harbour	Oct 89	(4 Qtr 91)
Metro Toronto	Feb 90	(4 Qtr 92)
Port Hope Harbour	Feb 90	(4 Qtr 91)
Bay of Quinte	Jan 90	(4 Qtr 91)
St Lawrence River	(3 Qtr 91)	(2 Qtr 92)

*According to Section 4(d) of Annex 2 the Remedial Action Plans shall be submitted to the Commission for review and comment at three stages:

I. When a definition of the problem has been completed;
II. When remedial and regulatory measures are selected; and
III. When monitoring indicates that identified beneficial uses have been restored.

RAPs - Key Accomplishments

- A high level of local community awareness and support has been established and sustained for RAPs. The principle of an ecosystem approach to environmental restoration and protection has been embraced by a wide range of stakeholders, providing a common point from which consensus on issues has been achieved. Adoption of this approach in conjunction with a comprehensive program of public involvement represents a significant change from past environmental management practices and provides an opportunity and basis for continuing progress. The RAP program is viewed across North America and abroad as a model for local environmental planning and action.
- The problem definition phase (Stage I) of RAP development is nearing completion. This phase has proven to be more extensive than originally conceived, requiring the investment of substantial government resources in technical investigations and environmental monitoring. The COA RAP program has recognized the importance of a comprehensive assessment of use impairments and has stressed the importance of a thorough understanding and public discussion of problems to be addressed. This understanding, to be supported by ongoing research and analysis, provides the basis for informed decisions on environmental remediation.
- Government agencies working on RAPs have demonstrated that an integrated multi-agency and multi-disciplinary approach to planning is achievable. Although much remains to be done to broaden and deepen the connections amongst agencies, the RAP program has demonstrated that the RAP Team approach stimulates a higher degree of co-ordination amongst agencies, resulting in more effective and efficient use of public resources. Emphasis will be given to fulfilling the public need for sound factual information on the complex issues of public and environmental health.
- The RAP program has served as a catalyst for the development and dissemination of new approaches and techniques for environmental remediation. The philosophy of "pollution prevention" is being popularized through the RAPs as a prerequisite to ensure the sustainability of derived benefits. Public interest and demands for "soft" as well as "hard" solutions has led to an increased emphasis on public information and education as a tool for achieving RAP objectives. Remedial options currently under consideration by RAP Public Advisory Committees hold promise for influencing corporate and household behaviours and attitudes towards use of the aquatic resource. Through programs such as the federal Great Lakes Cleanup Fund and provincial Environmental Technologies Program, RAP areas are serving as demonstration sites for new technologies and techniques. This is particularly evident in the fields of habitat restoration, combined sewer overflow control, industrial process change, sediment cleanup and phosphorus discharge control.
- The RAP program has drawn additional attention at a local, provincial and federal level to the importance of land-use planning in the restoration and protection of the aquatic resource. Through the RAP process, sources of impairments within Great Lakes Areas of Concern are traced to their origin in tributary watersheds. Land-use within watersheds has a profound influence on water quality in the Great Lakes. In turn, water quality is of critical importance in defining the quality and quantity of shore-based recreational and commercial activities which may be sustained. This interconnection has been highlighted in RAPs to date and will undoubtedly be given further emphasis as RAPs proceed.
- Through the RAP program, human health aspects of pollution and cleanup activities have emerged as important issues. At the request of RAP Teams and PACs - especially in the St. Lawrence River, Hamilton Harbour, St. Clair River and Bay of Quinte Areas of Concern - Health and Welfare Canada has provided advice on Stage 1 Reports and Options Discussion Papers. Continuing participation in the review of Remedial Action Plans for Superfund sites in Massena, New York has been important to the St. Lawrence River RAP in order to ensure that the proposed strategies are protective of the health of Canadians. Information packages on health including disease

incidence statistics for specific communities and information on federal standards have been compiled to respond to specific needs.

Public Involvement in Remedial Action Plans (RAPS)

The best known model for intensive public involvement in the Great Lakes Basin is the RAP program. Under this program, 16 Ontario communities have formed Public Advisory Committees, three of which are binational. In addition to more than 400 individuals who sit on these Committees, several thousand individuals have asked to be included on mailing lists to receive documentation about Remedial Action Plans as they develop. The Public Advisory Committees, in consultation with others in their community, set the goals towards which remedial measures are directed. They work closely with government, usually meeting monthly, to define problems and find workable solutions. Along with others in the community, they will hold implementors of Remedial Action Plans accountable for their actions.

Remedial option documents have been prepared and released for public review at four sites: Hamilton Harbour, Metro Toronto, Bay of Quinte and Severn Sound. The Bay of Quinte Public Advisory Committee released its report and recommendations in 1990 providing a strong basis for completion of that RAP in 1991. In 1990, RAP Public Advisory Committees formed a basin-wide council to provide an information sharing function on issues of common interest and to liaise with the RAP Steering Committee on policy and program development. The Bay of Quinte and Hamilton Harbour PACs are actively considering an appropriate role and structure for public involvement during the implementation phase. Evidence of the COA commitment to public consultation is the total of $1.1 million allocated by Environment Canada and the Ontario Ministry of the Environment to support public involvement and information activities in fiscal year 1990/91.

B Lakewide Management Plans

One of the important changes in the 1987 Protocol amending the Great Lakes Water Quality Agreement was a new provision calling for the development and implementation of Lakewide Management Plans (LAMPs) as a means of reducing the levels of designated Critical Pollutants in open lake waters. Specifically, Annex 2 of the Agreement requires that Canada and the United States along with provincial and state governments, develop and implement LAMPs for open waters, except for Lake Michigan where the United States has sole responsibility.

The need for a LAMP became increasingly apparent as a result of widespread fish consumption advisories and evidence of toxic pollution in the open waters of the Great Lakes. Furthermore, it was recognized that a multi-media, multi-source and multi-jurisdictional approach, similar to the lakewide phosphorus reduction plans, would be necessary to address the problems of the open waters. As with phosphorus, it was recognized that the LAMPs for Critical Pollutants should be focused on total loadings to the Lakes and impairments resulting from chronic exposure to low levels of pollution. They are to integrate programs and measures addressing the more acute problems of the localized Areas of Concern with the need for lakewide protection.

By adopting this new integrated approach to toxic pollution, it is the intent of both countries that LAMPs will address Critical Pollutants as well as advance the broad range of activities and goals of the Great Lakes Water Quality Agreement. In that regard, LAMPs for Critical Pollutants will serve as an important step in achieving zero discharge and virtual elimination of persistent toxic substances.

LAMPs will be measured not only by the effect they have on reducing loadings of Critical Pollutants in the respective Lake Basins but also on the extent to which they contribute to meeting the ecosystem objective of the Great Lakes Water Quality Agreement.

The involvement of the public in these activities has been in the form of workshops. A public workshop was held in April, 1989, to discuss public input into a Canada/United States framework for Critical Pollutants in Lakewide Management Plans. The Parties subsequently developed a **Framework for Lakewide Management Plans for Critical**

Pollutants, incorporating input received at a second public workshop held November 17, 1989, in Toronto. The Framework provides a clear and detailed articulation of the requirements for LAMPs based upon the outline provided under Annex 2 of the Great Lakes Water Quality Agreement. The Framework was signed by the Parties (Canada and the United States) and distributed to the interested public on April 4, 1990.

The Parties have also developed **Lakewide Management Plan Review Criteria**. These criteria will serve as a guide to the authors of LAMPs. By posing a number of questions that will be the focus of the Parties' review of the individual LAMP documents, the criteria identify key elements which must be incorporated into the LAMP.

A review of resource needs and work elements with respect to converting the Lake Ontario Toxics Management Plan (see section **D. Lake Ontario Toxics Management Plan**) into a LAMP was agreed to by the Parties. This Review is presently under way.

The Parties have also initiated studies which will lead to the establishment of a Critical Pollutants List for Lake Ontario.

Environment Canada is leading an assessment of the first 13 beneficial use impairments identified in Annex 2 of the Great Lakes Water Quality Agreement and their causal relationship to levels of pollutants in the Lake Ontario ecosystem. The United States Environmental Protection Agency is assessing the loss of fish and wildlife habitat. The results of both studies will be subjected to extensive public consultation prior to the Parties reaching a final decision on the Critical Pollutants List.

A workshop was held December 12, 1990, which initiated discussions regarding the mass balance effort required in support of the Lake Ontario LAMP. The LAMP process utilizes the mass balance approach as a tool in gathering and analyzing information on concentrations, sources and pathways of Critical Pollutants. Initial discussions have focused on the information requirements of the decision-making processes which establish pollutant reduction and elimination strategies, in an effort to determine the size and complexity of the mass balance effort required. Commencement of field studies is projected for 1992.

In the Framework, the Parties addressed several points from the workshops and expressed their intent to establish advisory councils comprised of representatives of the United States and Canadian public and private sector organizations, including non-profit organizations having an interest in the development and implementation of Lakewide Management Plans. The councils will provide important input and advice to the LAMPs working committees from the inception of the Lakewide Management Planning process through implementation.

It is also the Parties' intent that public meetings and information workshops will be held at appropriate stages in the development

Lakewide Management Plans - Public Participation

Lakewide Management Plans are in preliminary stages of development. A small number of interested citizens participated in a public workshop held in April, 1989, at which a planning framework was discussed. At that time, they recommended the formation of advisory councils, comprised of the United States and Canadian public and private sector organizations. Their recommendations were subsequently accepted by the agencies. The complete formation of the councils will not occur until a decision is made by Environment Canada, the Ontario Ministry of the Environment, United States Environmental Protection Agency and the appropriate U.S. state agency, as to which Lake(s) will receive priority attention.

A review is currently under way to determine the feasibility of converting the Lake Ontario Toxics Management Plan into a Lakewide Management Plan. An accompanying review of plans for public involvement in this activity will also be required. At the very least, public meetings will be held to correspond with the four review stages called for in Annex 2 of the Agreement. These are:

- *problem definition;*
- *determination of a schedule of load reductions;*
- *selection of remedial measures; and*
- *elimination of the impairment of identified beneficial uses by Critical Pollutants.*

and implementation of the plans at sites around each Lake Basin. At a minimum, public meetings will be held to correspond with the four review stages called for in Annex 2 of the Agreement.

C Niagara River Toxics Management Plan

The Niagara River Toxics Management Plan (NRTMP) Declaration of Intent was signed on February 4, 1987, and committed the Four Parties to achieving a 50 per cent reduction in loadings of certain priority persistent toxic chemicals from both point source and non-point source discharges by 1996. On the basis that they have been measured in the ambient environment at levels which exceed the most stringent criterion applicable to the Niagara River Basin, ten toxic chemicals have been placed on the list for 50 per cent reduction.

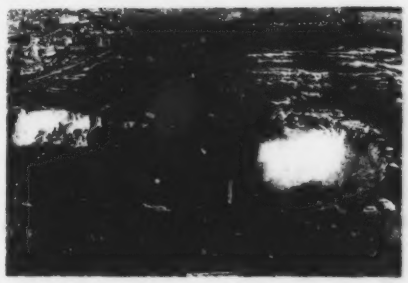
An extensive Upstream/Downstream River Monitoring Program has been developed using sampling and analytical protocols agreed to by the Four Parties. The program has been operated by Environment Canada since 1986-1987. Agency monitoring programs provide data for point source and non-point source discharges to the Niagara River but do not utilise agreed upon sampling and analytical protocols.

An ad hoc working group has been formed under the NRTMP to prepare the first Niagara River 50 Per Cent Reduction Progress Report. Using the three years of data (1986-87, 1987-88, 1988-89) collected since the signing of the Declaration, the progress report will serve as an important report card on our ability to date to reduce loadings to the Niagara River, to effectively measure changes in point and non-point source inputs, permitting accurate assessment of our progress in achieving the 50 per cent reduction target.

D Lake Ontario Toxics Management Plan

The Niagara River Declaration of Intent, signed by the Four Parties in February, 1987, also included a commitment to develop a toxics management plan for Lake Ontario. The draft Lake Ontario Toxics Management Plan (LOTMP) was tabled in January, 1988, and finalized after extensive public consultation in February, 1989.

The far-reaching goal of the Plan is a Lake that provides drinking water and fish that are safe for unlimited human consumption, and that allows natural reproduction of the most sensitive native species. Towards the achievement of this goal, the Plan calls for the development of preliminary load reduction targets by March, 1990 (overdue), and final load reduction targets by 1994. Four objectives are to contribute to meeting the load reduction targets identified.



Niagara River and Lake Ontario Toxics Management Plans - The Public:

Public involvement in these plans began in the developmental stages and has evolved somewhat over time. Currently there are three mechanisms for involvement. These are:

- *membership on one of the technical committees under the Plans (one United States and one Canadian citizen per technical committee);*
- *participation in workshops held at least annually for each plan; and*
- *participation in open meetings of the co-ordinating committee which makes decisions on programs and budgets to be allocated under the plan.*

The increased participation of municipal and industrial sector representatives is sought, due to the potential impact of these activities on their sectors.

In 1990, the public involvement mechanisms were expanded to include one Canadian and one United States citizen actively participating on each of the six technical sub-committees; expansion of the mailing lists; increase in the number of workshops with the advice of external organizations who are participating on an ongoing basis. Citizens are also asked to review mailing lists and to suggest changes, improvements and ways to involve and educate more people about the NRTMP and LOTMP.

Agencies have asked environmental and non-governmental organizations to encourage their membership to attend the NRTMP and LOTMP meetings by advertising meeting announcements in the public service announcement portion of their newsletters.

A workshop was held in June, 1990, in Niagara Falls, Ontario to discuss the NRTMP and other issues.

These are: (1) reduction in toxic inputs driven by existing and developing agency programs; (2) reduction in toxic inputs driven by special efforts in geographic Areas of Concern; (3) further reductions in toxic inputs driven by lakewide analysis of the fate of pollutants, which is to be conducted under the LOTMP; and (4) zero discharge. On December 10th and 13th, 1990, the LOTMP Secretariat held a workshop to discuss the status of the updated draft LOTMP.

E Canadian Environmental Protection Act

In June, 1988, Canada enacted the Canadian Environmental Protection Act (CEPA) as the legislative basis for the comprehensive management of chemicals in society. In the implementation of CEPA, a list of 44 priority substances was developed by an expert panel appointed by the Ministers of Health and Welfare and of the Environment. Specific provisions are in place to add to this first list. These substances must be assessed within five years of the publication of the list (February 1989) to determine whether they may pose a risk to human health or to the environment. Substances found to pose a risk (to be "toxic") are added to Schedule I (List of Toxic Substances) of CEPA and appropriate measures are developed to control their presence in the environment. Regulations are implemented following public consultations.

As of December, 1990, two substances, dioxins and furans, have been assessed and deemed to be toxic. Two regulations are being finalized for the control of dioxins and furans in effluents from pulp mills using chlorine bleaching and for restricting the sale and use of defoamers and woodchips used in the pulp and paper process which give rise to the formation of dioxins and furans. A CEPA assessment report on pulp mill effluents using chlorine bleaching is scheduled for publication in summer 1991. Depending on the findings of this assessment report, additional regulatory controls may be developed for effluent containing organochlorine compounds.

In Canada's Green Plan, the Government of Canada commits to accelerating the assessment process and to complete the assessment of 100 priority substances by the year 2000, and to enact regulations for all those substances found to be toxic.

The Ontario Ministry of the Environment is informed of regulatory and other initiatives through its participation in the Federal-Provincial Advisory Committee established under CEPA and also through participation on various committees of the Canadian Council of Ministers of the Environment.

F Fisheries Act

The Fisheries Act was first enacted prior to Confederation. In the 1970s, a major component on habitat protection was added to the Act. The Fisheries Act is, at present, the strongest piece of federal legislation for the control of water pollution to protect fisheries and for the protection of physical habitat. The Department of Fisheries and Oceans has been very active, in collaboration with the Ontario Ministry of Natural Resources, in applying the Act to a variety of development projects throughout the Great Lakes Basin.

The Fisheries Act is applied in a manner consistent with the Department of Fisheries and Oceans' Policy on the Management of Fish Habitat. The goal of this Policy is a net gain in the productive capacity of fish habitats. This means that Canada and Ontario are not only holding the line on habitat loss, but are seeking to rehabilitate degraded ecosystems.

Under the pollution prohibition component of the Fisheries Act, effluent regulations and guidelines were established in the 1970s for seven industry sectors in Canada. Status reports on the progress of these sectors in pollution abatement have been published for the major sectors (mining, petroleum, pulp and paper) every three to five years. The pulp and paper effluent regulations have been revised to tighten controls and are soon to be published in the Canada Gazette, Part 1. The regulations for the mining sector are also being revised. In addition to the regulations and guidelines, the "general prohibition" Section (36,c3) of the Fisheries Act prohibits the deposit of "deleterious substances" of any type in water frequented by fish. This section provides a very strong mandate for the federal government to address pollution concerns.

G Ontario Environmental Protection Act

In 1980, Ontario enacted the Environmental Protection Act, which together with the Ontario Water Resources Act and the Pesticides Act, provide for a broad range of

possible actions and regulations. One such undertaking is the Municipal-Industrial Strategy for Abatement (MISA) initiated in June, 1986.

The goal of the Municipal-Industrial Strategy for Abatement (MISA) is the virtual elimination of toxic contaminants from all industrial and municipal effluents discharging into Ontario waterways. The MISA goal is consistent with the general principle of Annex 12 of the Great Lakes Water Quality Agreement, which states that "the intent of programs specified in this annex is to virtually eliminate the impact of persistent toxic substances". The MISA program will systematically reduce water pollution at its source with enforceable regulations which become more stringent as abatement technology improves.

For direct industrial dischargers there will be two series of regulations: Effluent Monitoring Regulations and Effluent Limits (Abatement) Regulations. The Monitoring Regulations require the dischargers to measure the types, concentrations and total amounts of toxic substances present in their effluents. Resulting data will be used, with other information, to establish Abatement Regulations. The end-of-pipe discharge limits will be based on Best Available Technology Economically Achievable (BATEA).

There are two regulatory components to the direct municipal dischargers program: the control of direct discharges from municipal sewage treatment plants, and the control of discharges to municipal sewers from industries (Sewer Use Control Program).

As of December, 1990, all industrial sector monitoring regulations have been promulgated, and five industrial sectors have completed their year of intensive monitoring, while the other four sectors are under way.

To standardize procedures and criteria in developing Abatement Regulations, an issues resolution process is under way to resolve key issues common to all industrial dischargers. Representatives from the Ontario Ministry of the Environment, Environment Canada, the MISA Advisory Committee, industry and municipalities are participating in resolving these issues.

Costs have been estimated for municipal compliance with various proposed sewage treatment plant regulations. Discussions are being held by the Ontario Ministry of the Environment and the Ontario Ministry of Municipal Affairs on the affordability of the proposed regulation. Possible strategies for assisting in implementation are also being considered.

The MISA Sewer Use Control Program will help eliminate the discharge of toxic contaminants and pollutants into sanitary sewers. To assist in the continued development and implementation of the program, the Ontario Ministry of the Environment is undertaking a number of projects. These include a Sewer Use Training Program for municipal staff, Municipal Demonstration Projects to determine the practicality of the sewer use program and the development of a Computerized Data Management System. Approximately twenty municipalities have already promulgated new sewer use by-laws which are based on the 1988 Model By-Law. These twenty municipalities represent about 60 per cent of Ontario's population.

The MISA Program principles are being scrutinized at this time. Additional methods of reducing pollution, including such concepts as zero discharge of hazardous contaminants and the reduction of pollutants at source (pollution prevention) are being considered by the provincial government.

Public Consultation for the Municipal-Industrial Strategy for Abatement (MISA).

MISA is comprised of five key components, the first of which is pre-regulation consultation and public participation. It is recognized that full participation of affected municipalities, industries and the public is vital to the success of the program. The general public, as well as interest groups, have significant opportunities for involvement throughout the development of MISA regulations. Beginning with the 60-day public review of the White Paper announcing the MISA program, the commitment to involving the public in the regulation-setting exercise extended to include public review of draft monitoring regulations.

Public consultation has been ongoing during development of the abatement regulations, which is currently under way. Further opportunity for public input into MISA will be available once draft versions of the abatement regulations are released for review and comment. As well, the Ontario Ministry of the Environment is committed to providing the public with complete access to data on containment discharges and on the effluent limits set for all discharges once the abatement regulations are in effect.

H Sewage Works Upgrade

The Province of Ontario is continuing to provide transfer payments to municipalities for upgrading and expanding sewage treatment facilities and collection systems. In addition to the Direct Grant Program the province also contributes grants to municipalities under the LifeLines Program.

The LifeLines Program goal is to improve and protect the quality of ground and surface waters. The program provides financial assistance to municipalities to develop and plan for remedying existing water pollution problems, and to assess and rehabilitate water and sewer lines. Since 1986, the province has contributed over $25 million and $35 million for studies and rehabilitation work under this program.

I Industrial and Municipal Direct Dischargers Monitoring

The Province of Ontario continues to report annually on both Industrial and Municipal Direct Discharges. The 1988 Municipal Discharge Report provides a comprehensive summary of the performance of all sewage treatment plants in Ontario. Three parameters (Biochemical Oxygen Demand, Suspended Solids and Total Phosphorus) were assessed and compared to the Ontario Ministry of the Environment Sewage Effluent Guidelines defined in Policies 08-01 and 08-04. The 1988 Municipal Discharge Report also assessed a large proportion of sewage treatment plants against the effluent limits stipulated in their Certificate of Approval.

The 1988 Industrial Discharge Report provides average monthly effluent flow and loads discharged by source, actual loadings versus effluent limits on a monthly and annual basis, tables of remedial actions for sources not meeting limits criteria and a table of new Ontario Ministry of the Environment enforcement actions.

The Ontario Ministry of the Environment reports sewage treatment plant discharges including total phosphorus on a monthly basis. Compliance limits for effluent concentrations are still set to one milligram per litre on an annual basis. Work is being carried out to revise the phosphorus compliance limits.

In areas that have limited receiving assimilative capacity (ie. the Grand River)

sewage treatment plant expansions are restricted to the phosphorus loads of the pre-expansion facility.

The Ontario Ministry of the Environment, Environment Canada and the Municipal Engineers Association (MEA) sponsored the **Thirty-Seven Municipal Water Pollution Control Plants Study** to provide information necessary to support the development of a cost-effective and practical monitoring regulation. Thirty-seven sewage treatment plants were monitored including 28 secondary treatment plants, seven primary treatment plants and two lagoons. Influent and effluent flows and raw and treated sludge were collected for one to two consecutive five-day periods. The monitoring list included 122 organic contaminants, 15 metals and conventional contaminants.

The Ontario Ministry of the Environment and Environment Canada are sponsoring the **Acute and Chronic Toxicity Evaluation of Ontario STP Effluents**. The study is assessing the lethal and sublethal effluent toxicity from ten sewage treatment plants for both summer and winter conditions. Acute toxicity tests using rainbow trout and **Daphnia magna** are being examined. Chronic fathead minnow survival and growth tests and **Ceriodaphnia dubia** survival and reproduction tests are also being carried out.

J Stationary Source Control

Ontario is currently developing a new regulation to replace Regulation 308 as the principal regulation under the **Environmental Protection Act** controlling emissions to air from stationary sources. Most importantly, the Ministry will introduce emission limits on facilities or processes to replace the dilution policy in Regulation 308.

A detailed program description titled the Clean Air Program was released in August,

1990, for a 180-day public comment period. The proposed regulation requires significant air pollution sources to: meet emission limitations based on the hazardous nature of the contaminants being emitted; demonstrate predicted compliance with strict community air quality standards using state-of-the-art dispersion models which take into account all neighbouring sources; have a renewable (every ten years or upon change of the ownership of the facility) certificate of approval to construct and operate; comply with specific monitoring requirements; and register emissions to the atmosphere on an annual basis.

(K) Industrial and Municipal Waste Management Program

Ontario's Waste Management Program is regulated under the provincial Environmental Protection Act. The regulation sets out a chain of responsibilities from waste generation through transportation and disposal in controlling liquid industrial and hazardous wastes.

In June, 1987, the Ontario Government announced the $9 million Comprehensive Funding Program (CFP) for waste management, which provides financial assistance to municipalities and the private sector for waste management activities. These activities include waste management (treatment and disposal); municipal and industrial waste reduction, reuse, and recycling; Student Action For Recycling Program (STAR); the Household Hazardous Waste Program (collection events/facilities); and storage of PCBs.

Waste Management Program

The Waste Management Program is a grant assistance program, which provides municipalities with funding for monitoring, technical evaluation and long term waste management planning. Sub-components of this program are described below:

- The Waste Management Improvement Program (WMIP) provides funds to municipalities to upgrade sites, close sites properly and investigate and propose remedial works. Technical projects undertaken include hydrogeological studies; a site operation and development plan; a contingency plan; leachate and methane monitoring; creation of an on-site buffer area; and site closure.

  To date, 1,550 projects at a cost of $14 million have been funded. In 1990-1991, 98 projects requiring $4.5 million will be supported.

- The Waste Management Master Plan (WMMP) provides funds for groups of municipalities for the development of comprehensive long range (20 years) waste management plans that incorporate system components to minimize the use of landfill, while considering alternatives such as reduction, reuse, and recycling.

  Forty-four studies are currently under way. Two have been completed (North Easthope Group and Waterloo Region). The budget allocated for fiscal year 1990/1991 is approximately $1.9 million.

- Financial Assistance Program (FAP) was introduced in 1987 to effectively bridge the funding gap between the Waste Management Master Plan and the Waste Management Improvement Program (planning and operating phases). The Financial Assistance Program assists municipalities in establishing landfills, transfer stations, Household Hazardous Waste depots or processing facilities.

  Since 1989, 140 projects were approved and $14.3 million has been provided to municipalities to support the development of new waste management facilities. In 1990-1991, 85 projects have received a commitment for funding totalling $10 million.

Municipal Waste Reduction, Reuse, and Recycling Program

The Municipal Waste Reduction, Reuse, and Recycling Program provides grant assistance for diverting waste away from landfill sites. Four components of this program are described below:

- Municipal Recycling Support Program (MRSP): MRSP subsidizes capital purchases and operational expenses associated with the recycling projects. Furthermore, MRSP provides grants for demonstration projects, educational programs and feasibility studies. Typically, the projects funded involve the collection of recyclables at curbside

from single family dwellings. Projects using depot collection systems in rural areas are also funded. Materials recovered by recycling projects are typically newspaper, glass containers, metal cans and plastic soft drink containers.

Total spending by the Ontario Ministry of the Environment under the MRSP from 1986 to 1989 has been 29.7 million. In 1989-90, the MRSP expenditure was $17.7 million to support 107 recycling projects in 340 municipalities and over 250,000 tonnes of materials were diverted from landfill. The budget for 1990-1991 is $21.2 million. Municipal recycling is expected to divert over 340,000 tonnes of material this fiscal year. By the end of 1990, approximately 2.5 million of Ontario's 3.7 million households will have access to multi-material programs.

The Ontario Ministry of the Environment will promote the addition of fine paper, mixed plastics, film plastics, corrugated cardboard, boxboard and large items (appliances, furniture, etc.) in municipal recycling projects.

- Municipal Reduction/Reuse Program (MRRP): MRRP provides grants to municipalities for activities which are aimed at changing consumer attitudes or behaviour with respect to waste generation habits (e.g., home composting and discouraging purchase of overpackaged goods). The most popular grant under this program is for home composting units. To date, the Ontario Ministry of the Environment has approved or is in the process of approving grants to 160 municipalities totalling over 240,000 bins representing a financial commitment of $3.8 million. By 1991-92, it is expected that 160 new municipalities will request an additional 260,000 backyard composters requiring $6.8 million of Ontario Ministry of the Environment support.
- Student Action for Recycling Program (STAR): STAR is available to elementary and secondary schools. Capital items such as collection equipment, building modification, materials safety and monitoring equipment and vehicles are eligible for up to two-thirds funding. The objective of the program is to implement recycling within five years in all schools in the province.

  The full-scale recycling program for schools was announced in October, 1989. This program has an estimated Ontario Ministry of the Environment funding requirement of up to $10 million (over 5 years). To date, 15 school boards with a total of 828 schools have been approved for grants totalling $685,625. The total estimated recyclable material (initially diverted from landfill) is 2,300 tonnes per year.

Industrial Waste Reduction, Reuse, and Recycling Program

The industrial program provides assistance for all industrial and commercial sectors to take advantage of new opportunities for waste diversion from disposal. This program provides financial and technical assistance to explore beneficial uses of commercial and industrial wastes and their reduction. Activities eligible for funding include feasibility studies, process or equipment modification or evaluation, demonstration of technology and research. Wastes such as cardboard, rubber, plastics, solvents and CFCs are included in this program. Two hundred and thirty-six projects, at a cost of $16.6 million have been funded since 1986, diverting 712,000 tonnes of non-hazardous wastes and 74,000 tonnes plus 92 million litres of hazardous wastes annually.

Household Hazardous Waste Program (HHWP)

The purpose of this program is to provide grants to municipalities for programs to collect household hazardous waste. These programs can involve locked-lid boxes with householders who can then store wastes such as batteries, paints and other dangerous products.

To date, funding has been allocated for permanent Household Hazardous Waste disposal depots. This initiative has increased the mass of household hazardous waste diverted to depots from 35 tonnes in 1986 to more than 400 tonnes in 1990. A forthcoming Ontario Ministry of the Environment document entitled "Guidelines for the Establishment of Permanent Household Hazardous Waste Collection Facilities" is due to be published in 1991. This guideline will evaluate household hazardous waste collection methods used by other jurisdictions. It will assess various case studies including permanent collection depot, collection day depot, selective collection, combination of permanent depot with collection day and phone-in, pick-up service in Ontario and other jurisdictions.

Polychlorinated Biphenyls (PCB) Storage

Environment Canada is preparing a PCB storage regulation under the Canadian Environmental Protection Act to replace the existing Interim Order on Storage of PCBs. To ensure that Ontario retains its control over PCB waste handling and storage, the two governments are working jointly to develop an equivalency agreement.

The co-operation of all levels of society is needed to further reduce the concentrations of contaminants in the environment. The goal of virtual elimination of persistent toxic substances in the Great Lakes Basin can only be achieved if all sectors of society move to reduce the contamination of the environment. Changes are required in individual actions, corporate strategies and regulatory initiatives by government agencies. Work related to the impact of these toxic substances in the Great Lakes Basin on ecosystem and human health will remain an important priority. All stakeholders will continue to have a part to play in the ongoing implementation of cleanup initiatives and the development of strategies for the prevention of pollution at source.

Summary of official responses to recommendations from the FOURTH and FIFTH BIENNIAL REPORTS of the International Joint Commission, and the International Joint Commission/Great Lakes Fishery Commission Report - EXOTIC SPECIES AND THE SHIPPING INDUSTRY: THE GREAT LAKES - ST. LAWRENCE ECOSYSTEM AT RISK (September 1990)

Under the **Fourth Biennial Report** of the International Joint Commission, the Parties were asked to respond to 36 recommendations covering a variety of issues including water quality, ecosystem health, human health, monitoring and surveillance. The recommendations and their responses are listed in Appendix Two.

Under the **Fifth Biennial Report**, the International Joint Commission has made five general recommendations to the Parties. Under the first recommendation the Parties were urged to stop the inflow of persistent toxic substances into the Great Lakes environment with specific recommendations on zero discharge, drinking water and human health. In response to this recommendation Canada and the United States are developing a binational pollution prevention initiative which will allow all sectors of society to contribute to the virtual elimination of persistent toxic substances from the Great Lakes Basin Ecosystem.

Both Canada and Ontario are working towards establishing effluent limitations for Critical Pollutants that are related to point source discharges. In Ontario, the reduction of water pollution will be systematically reduced through the Ontario Municipal Industrial Strategy for Abatement (MISA) program. The ultimate goal of this program is the virtual elimination of persistent toxic contaminants from all dischargers into Ontario waterways. Through the Environmental Protection Branch of Environment Canada specific regulatory initiatives are being developed for regulations of pulp and paper effluents; new substance notifications for polymers and chemicals; contaminated fuel; and the export and import of hazardous waste. Environment Canada is also developing a domestic substances list under the Canadian Environmental Protection Act. This list will identify substances that are already in use in Canada and are exempt from notification and assessment under the New Substances Provisions of the Act.

In response to human health concerns about chemical exposure, the government of Canada has committed $20 million over five years to the Great Lakes Health Effects Program. It is developing a National Drinking Water Safety Act, and continues to monitor, in co-operation with the Province of Ontario, food and water supplies.

Under the second general recommendation, all levels of government are encouraged to accept the responsibility of implementing the Great Lakes Water Quality Agreement. Specific recommendations were made in reference to public information and educational programs. Both Canada and the Province of Ontario have established a number of programs to encourage municipalities and private industries to comply with environmental objectives. These programs include MISA, CEPA, Remedial Action Plans (RAPs) and elements of the national Green Plan. The federal and provincial governments continue to produce public education and information materials such as RAP newsletters and various Great Lakes fact sheets.

In response to the third general recommendation for the development and implementation of RAPs, Canada and Ontario have paid particular attention to ensure that the public is consulted in all aspects of the RAP program. Where possible, RAP development is being expedited and implementation initiated prior to the submission of Stage II documentation.

Under the fourth recommendation the Parties have been asked to strengthen and adopt provisions for the prevention of spills.

These issues are addressed under the Federal Government's Green Plan and the report of the Public Review Panel on Tanker Safety and Marine Spills Response Capability, **Protecting Our Waters**. The government's objective is to implement measures that will result in environmentally safer methods of transporting petroleum products by water. Over the next five years, Environment Canada will work with the Canadian Coast Guard to improve marine spill contingency planning; upgrade cleanup equipment; improve and expand training programs for response personnel; and increase research.

This document represents Canada and Ontario's response to the fifth recommendation of the **Fifth Biennial Report**. This **Second Report of Canada** fulfils the reporting requirements for the period January 1, 1989 to December 31, 1990. Canada and the United States will be establishing a more formal process for the delivery of obligations under the Great Lakes Water Quality Agreement.

A final response section has also been included in the Appendix which addresses the International Joint Commission/Great Lakes Fishery Commission's September, 1990, report entitled **Exotic Species and the Shipping Industry: The Great Lakes-St. Lawrence Ecosystem at Risk**. Both the Canadian and the United States' Coast Guards are working together to address the recommendations made within this report. Preliminary discussions have been held to develop integrated ballast exchange guidelines for use during the 1991 shipping season. As a result of this report the federal departments of Fisheries and Oceans, Transport and Environment have jointly funded a $250,000 ballast water contract to Canadian and U.S. researchers. The study is expected to be completed by mid-1991 and will address the rate of voluntary compliance on ballast exchange of ships entering the Great Lakes and the possibility of more exotic species invading the ecosystem as a result of foreign ships exchanging their ballast in the Great Lakes.

FUTURE PERSPECTIVES

While there has been significant progress towards improving the water quality of the Great Lakes Basin, much remains to be done.

Over the last two years many new initiatives have been launched by federal and provincial agencies, citizen groups and industry. Much of this progress is owed to the many partnerships that have been formed at all levels, resulting from ongoing public consultation. Continued success of the many programs already in place depends upon maintaining and continuing the improvement of the partnerships between government, industry, public interest groups and citizens. Keeping this in mind, we must continue our efforts to consult with the public and involve them in programs throughout the Great Lakes Basin. We must build on the strong partnerships, commitment and interest fostered to date as these various programs evolve. Recognizing that citizens and public interest groups are becoming more informed and organized in voicing their views, Canada and Ontario are challenged in providing the public with meaningful and usable information.

This partnership theme must also extend to those parties charged with responsibilities for implementing the Great Lakes Water Quality Agreement. Working in co-operation with the International Joint Commission (IJC), the governments of Canada and the United States must establish measurable milestones in order to demonstrate progress in meeting the goals of the Agreement. In reviewing their commitment through the 1987 Protocol, Canada and the United States have embarked on the road to restoration and the eventual elimination of toxic chemicals.

Under the 1987 Protocol, new responsibilities have been given to the Parties to plan and deliver the Agreement. Following the Protocol, the Parties began to re-evaluate their respective roles under the Agreement.

Previously, the IJC had the responsibility of co-ordinating all Agreement activities, including reporting to governments. Under the terms of the 1987 Protocol, work under the Agreement is now co-ordinated under a binational structure. This will inevitably mean additional work for Canada and Ontario, since IJC staff support will no longer be available. Canada and Ontario continue to co-operatively assume the responsibility of implementing Canada's obligations to the Agreement including the reporting to the IJC on the progress of various Annexes. Canada and Ontario will also be required to produce regular reports on their activities, including interpretations of data, which will provide the basis for observations on the state of the Canadian Great Lakes Basin Ecosystem. This will be a major challenge since this role has traditionally been carried out by the IJC.

As an outcome of this new partnership, both Canada and the United States have agreed to respond to the recommendations in the IJC's **Fourth** and **Fifth Biennial Reports** within the context of their respective progress reports. Where appropriate, Canada and Ontario have integrated the IJC's recommendations with their ongoing programs in meeting the Agreement requirements.

Canada and the Province of Ontario are also faced with a number of challenges in their own working relationship. Currently, the two levels of government work together under the Canada-Ontario Agreement Respecting Great Lakes Water Quality. While it is obvious that Canada and Ontario must work together, the mechanism under which they will continue to work will be under review and renegotiated as the current Agreement expires on March 31, 1991.

During the last two years, Canadian efforts have expanded into a number of new areas. The focus is shifting from data collection into a more action-oriented form of implementation and remediation. We have recognized that remediation is not enough to ensure sustainable levels of water quality. Consequently, there is a need to develop appropriate indicators of pollution and its impacts and a means of preventing future pollution. Better indicators will enable a better assessment of the true health of the Great Lakes and its residents and will provide both a starting point for, and progress report of, Canada's programs. The Federal Minister of the Environment and the U.S. EPA

GREAT LAKE
LAKE SUPERIOR
1 Peninsula Har
2 Jackfish Bay
3 Nipigon Bay
4 Thunder Bay
5 St. Louis Bay/
6 Torch Lake
7 Deer Lake -
Carp Creek/R
Boundary of the
Great Lakes Basin
Canada
United States
LAKE SUPERIOR
MINNESOTA
WISCONSIN
LAKE MICHIGAN
ILLINOIS
INDIANA
MICHIGAN

AREAS OF CONCERN

LAKE MICHIGAN

8 Manistique River
9 Menominee River
10 Fox River/Southern Green Bay
11 Sheboygan River/Harbor
12 Milwaukee Estuary
13 Waukegan Harbor
14 Grand Calumet River/ Indiana Harbor Canal
15 Kalamazoo River
16 Muskegon Lake
17 White Lake

LAKE HURON

18 Saginaw River/Saginaw Bay
19 Collingwood Harbour
20 Severn Sound
21 Spanish River Mouth

LAKE ERIE

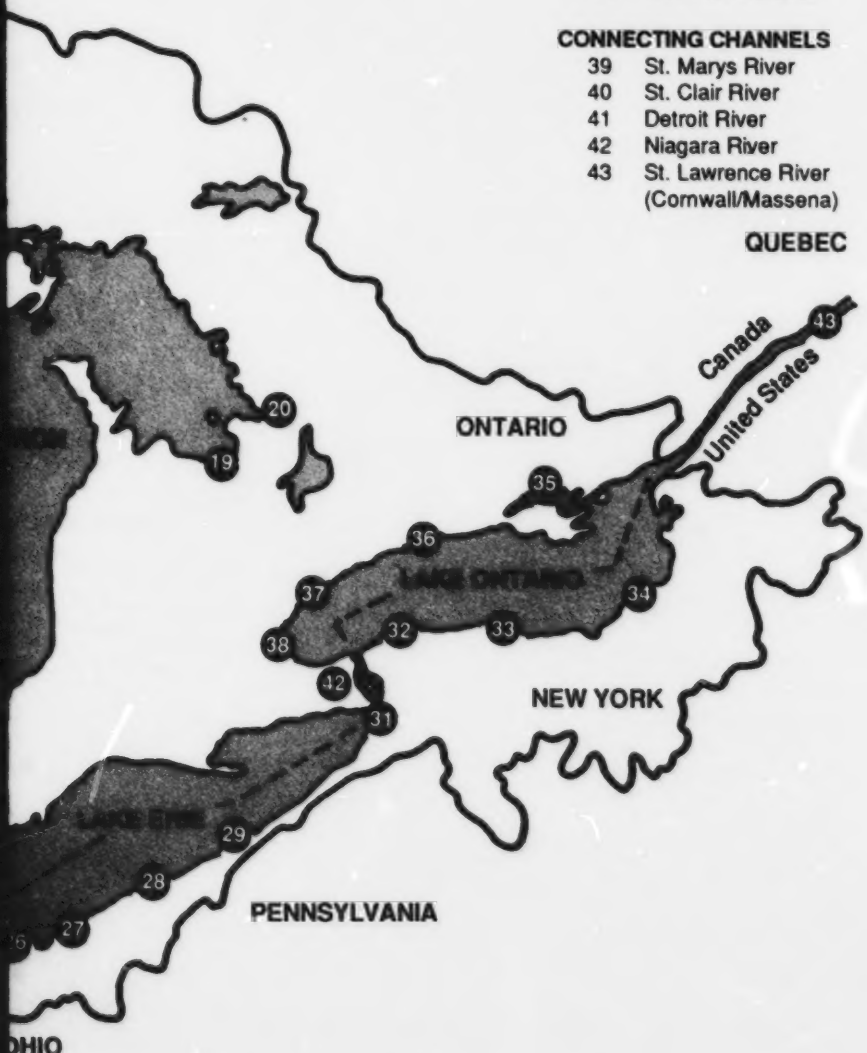
22 Clinton River
23 Rouge River
24 River Raisin
25 Maumee River
26 Black River
27 Cuyahoga River
28 Ashtabula River
29 Presque Isle Bay (Proposed)
30 Wheatley Harbour

LAKE ONTARIO

31 Buffalo River
32 Eighteen Mile Creek
33 Rochester Embayment
34 Oswego River
35 Bay of Quinte
36 Port Hope Harbour
37 Metro Toronto and Region
38 Hamilton Harbour

CONNECTING CHANNELS

39 St. Marys River
40 St. Clair River
41 Detroit River
42 Niagara River
43 St. Lawrence River (Cornwall/Massena)



Administrator have already met to discuss the development of a pollution prevention initiative. The initiative will be based on the virtual elimination of toxic chemicals, including but not limited to, prohibition of some chemicals, the development of non-toxic alternatives, and tighter regulations if required.

There has also been an increased awareness of human health and ecosystem integrity. In future government programs, land, air and water in the Great Lakes Basin will continue to be viewed as integral components of the entire ecosystem. Canada and Ontario will continue monitoring and surveillance programs on the Great Lakes Basin and will develop mechanisms to monitor progress of programs at the international level. Through these activities we can begin to monitor trends in the environment that may result from climate or ongoing changes which in turn could impact the Great Lakes Basin.

It is obvious that the success of future programs depends on shared responsibility at all levels of society. We must all work together towards a cleaner and healthier Great Lakes environment.

Canada and Ontario appreciate the opportunity to describe the progress that has been made towards implementing the Great Lakes Water Quality Agreement and look forward to the IJC's **Sixth Biennial Report**.

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ACKNOWLEDGEMENTS

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I. Fourth Biennial Report of the International Joint Commission

A. Institutional Arrangements and Programs for Ensuring Progress under the Agreement.

Eutrophication

Recommendation 1

The Parties and jurisdictions undertake studies to determine the levels of nitrogen compounds which endanger the health of humans and livestock, and consider programs to address this emerging problem if the current trend of increasing levels of nitrogen compounds continues. (4th, p. 12)

Response 1

The Ontario Ministry of Agriculture and Food initiated the "Partners in Nitrogen Studies" in 1990 to establish an improved system for nitrogen recommendations to ensure nitrogen fertilizer which will provide an economic response while minimizing nitrate transport out of the root zone into the groundwater.

National Health and Welfare has recently completed an evaluation of nitrates in drinking water and has prepared a new guideline.

Introduction of Non-Native Species

Recommendation 2

The Parties take steps to prevent the further introduction, particularly the unplanned introduction, of exotic life forms into the Great Lakes ecosystem. (4th, p. 15)

Response 2

As a result of the International Joint Commission/Great Lakes Fishery Commission report on Exotic Species (September, 1990), the Department of Fisheries and Oceans, the Department of Transport and Environment Canada co-operated to fund a $250 thousand ballast water contract to Canadian and U.S. researchers. The contract sought to quantify the rate of voluntary compliance of ships entering the Great Lakes. A further objective was to determine the possibility for more exotic species entering the ecosystem as a result of foreign ships exchanging their ballast in the Great Lakes. The study is expected to be completed by mid 1991. Please refer to Section III. Response of the Canadian Government to the GLFC/IJC Report entitled **Exotic Species and the Shipping Industry.**

Coastal Wetlands

Recommendation 3

The Parties and jurisdictions increase efforts to rehabilitate, protect and preserve Great Lakes coastal wetlands and to strengthen and initiate programs which reverse wetland loss. (4th, p. 15)

Response 3

Substantive programs are currently in place which address efforts to rehabilitate, protect and preserve Great Lakes coastal wetlands and reverse wetland loss using appropriate legislation.

Major initiatives include the Ministry of Natural Resources' "Wetlands Management Program", Environment Canada's "Wetlands at Risk" Project, Department of Fisheries and Oceans' use of the Fisheries Act and the Policy for the Management of Fish Habitat (1986).

Another multi-sectoral initiative is the North American Waterfowl Management Program which is intended to protect vast areas of wetlands and habitat essential to migratory waterfowl in Canada and the United States.

The 1987 Protocol Amending the 1978 Great Lakes Water Quality Agreement

Recommendation 4

The Parties, in conjunction with the jurisdictions, develop and implement a Binational Toxics Management Strategy for the Great Lakes Basin Ecosystem to guide Canadian and United States domestic initiatives and to ensure that a more co-operative and co-ordinated approach is taken in response to the commitments made under the Protocol. (4th, p. 18)

Response 4

The Governors of the eight Great Lakes States signed a Memorandum of Understanding on the Control of Toxic Substances in 1986. Quebec and Ontario signed the Memorandum in June 1988. The Toxic Substances Control Agreement calls for the establishment of a framework for co-ordinated regional action to control toxic substances.

The Integrated Atmospheric Deposition Network Implementation Plan, signed by the Parties on June 14, 1990, is a very significant bilateral step taken in a co-operative and co-ordinated way to address the air toxics requirements in Annex 15 of the 1987 Protocol.

Environmental Legislation

Recommendation

The Commission calls attention of the Parties to the provisions of Article V of the Agreement which states: "Water quality standards and other regulatory requirements of the Parties shall be consistent with the achievement of the General and Specific Objectives. The Parties shall use their best efforts to ensure that water quality standards and other regulatory requirements of the State and Provincial Governments shall similarly be consistent with the achievements of these objectives." (4th, p. 19)

Response

The Binational Objective Development Committee is developing a protocol for evaluation and recommendation to the Parties of water quality objectives which will apply to U.S. and Canadian waters. The regulatory requirements of the Ontario Ministry of the Environment will be consistent with the attainment of these objectives.

Control of Point Sources of Pollution

Recommendation 5

The Parties and jurisdictions develop appropriate measures for reporting and assessing point source performance in relation to the Great Lakes Water Quality Agreement. (4th, p. 20)

Response 5

The Ontario Ministry of the Environment (MOE) reports on both Industrial and Municipal Direct Discharges on an annual basis. The Municipal Discharge Report provides a comprehensive summary of the flow and monthly performance of all Sewage Treatment Plants (STPs) in Ontario. Three parameters - Biochemical Oxygen Demand, Total Suspended Solids and Total Phosphorus - are assessed and compared to the MOE Sewage Effluent Guidelines defined in Policy 08-01 and 08-04. The 1988 Municipal Discharge Report also assessed a large portion of STPs against the effluent limits stipulated in their Certificates of Approval.

The Industrial Discharge Report provides average monthly effluent flow and loads discharged by source, actual loadings versus effluent limits on a monthly and annual basis, tables of remedial actions for sources not meeting limit criteria and a table of new MOE enforcement actions. In addition to the two monitoring programs, in 1988 the MISA program started sampling nine sectors for persistent toxic substances.

Environment Canada also routinely publishes (every two to three years) Sector Status Reports on the major industry sectors regulated under the Fisheries Act (e.g. pulp and paper, mining, petroleum refineries) to gauge the progress industries make towards meeting the regulations/guidelines effluent limits.

Recommendation 6

The Parties and jurisdictions intensify efforts to ensure compliance of municipal waste treatment facilities with the 1 mg/L effluent concentration of total phosphorus and report compliance on a monthly basis. (4th, p. 21)

Response 6

The Ontario Ministry of the Environment reports Sewage Treatment Plant discharges including total phosphorus on a monthly basis. Compliance limits for effluent concentrations are still set to 1 mg/L on an annual basis. The rate of compliance has improved from 53% in 1987 for those plants over 4546 cubic metres per day to 63% in 1988 and 66% in 1989. This improvement in the rate of compliance has occurred despite increases in STP effluent volumes discharged to Lake Erie and Ontario basins in the same period. Work is being carried out to revise the phosphorus compliance basis to make the policy consistent with current assessment practices.

In areas that have limited receiving assimilative capacity (i.e. the Grand River) STP expansions are restricted to the phosphorus loads of the pre-expansion facility.

Recommendation 7

The Parties and jurisdictions accelerate programs and initiatives to assure better quantification of toxic chemical loadings from municipal and industrial sources and to minimize their release. (4th, p. 21)

Response 7

The Ontario Ministry of the Environment (MOE), Environment Canada and the Municipal Engineers Association (MEA) sponsored the 'Thirty Seven Municipal Water Pollution Control Plants' study to provide information necessary to support the development of a cost-effective and practical monitoring regulation. Thirty-seven STPs were monitored including 28 secondary treatment plants, 7 primary treatment plants and 2 lagoons.

MOE is sponsoring the 'Acute and Chronic Toxicity Evaluation of Ontario STP Effluents'. The study is assessing the lethal and sublethal effluent toxicity from ten sewage treatment plants for both summer and winter conditions.

All direct discharging industrial monitoring regulations proposed under the Ontario Municipal-Industrial Strategy for Abatement (MISA) have now been promulgated. The monitoring regulations require the industrial discharger to measure the types, concentrations and total amounts of toxic substances present in their effluents. Resulting data will be used, with other information, to establish Abatement Regulations.

The Integrated Atmospheric Deposition Network will provide data on the loading of certain selected toxics to the Great Lakes. The linkage to control assumes that there is good knowledge of emissions and their transport and transformation. Currently this is not the situation. Monitoring may eventually play a role in assessing compliance with controls but the current Network has not been set up with this as an objective.

Recommendation 8

The Parties and jurisdictions provide sufficient resources and, where necessary, accelerate program development and implementation to meet the pretreatment requirements of Article VI of the Agreement. (4th, p. 22)

Response 8

The MISA Sewer Use Control Program will help eliminate the discharge of toxic contaminants and pollutants into sanitary sewers. To assist in the continued development and implementation of the program, the Ontario Ministry of the Environment is undertaking a number of projects. These projects include a Sewer Use Training Program for municipal staff, Municipal Demonstration Projects to determine the practicality of the sewer use program and the development of a Computerized Data Management System. Approximately twenty municipalities have already promulgated new sewer use by-laws which are based on the 1988 Model By-Law. These twenty municipalities represent about 60 percent of Ontario's population.

Control of Nonpoint Sources of Pollution

Recommendation 9

The Parties implement programs required to meet target loads for phosphorus and accelerating, if necessary, the current rate and priority of implementation in each jurisdiction. (4th, p. 23)

Response 9

Canada and the United States provided to the Commission a "Parties' Review of Phosphorus Control Measures" in April of 1990. This review looked at the "response" of Lakes Erie and Ontario to the entire phosphorus control program since 1972, as well as the current "loads" of total phosphorus to these Lakes. The Lakes have responded well and now are at, or near, their target concentrations of phosphorus. Reported loads are close to the targets set out in Annex 3.

The Canada-Ontario Soil and Water Environmental Enhancement Program (SWEEP) continues to encourage and support farmers to convert to conservation cropping and tillage. The effectiveness of this 30 million dollar program will be measured by the "1991 Cropping, Tillage and Land Management Practices Survey" and extrapolated to the Lake Erie Basin.

In spite of the excellent response of the Lakes, prudence dictates that existing control programs should continue but no new or accelerated efforts are needed at this time.

Recommendation 10

The Parties and jurisdictions ensure that adequate procedures are developed and funding is made available for the characterization and assessment of non-point source contaminant loadings to the Great Lakes and that appropriate controls are developed and implemented. (4th, p. 24)

Response 10

Procedures are available for the characterization and assessment of non-point source loading of contaminants to the Great Lakes.

Loading data developed from the streamflow monitoring network and the Ontario Provincial Water Quality Monitoring Network continue to provide the basis for the evaluation of loading trends of phosphorus. Detailed higher frequency data on sediment, phosphorus and other parameters, including pesticide and chemical residues, are obtained for the mouth stations of major significant tributaries in Ontario. Such data increase the precision of loading estimates and the ability to detect long term trends in loadings.

A screening survey is being conducted at the outlets of the five largest Ontario tributaries to Lake Ontario in support of the Lake Ontario Toxics Management Plan. Water, suspended sediments, and surficial bottom material are being examined for phosphorus and an extended list of many previously unmeasured organic chemicals. The results will provide estimates of mass loadings and help focus future monitoring activity.

Canada and the Province of Ontario have implemented many programs and measures to address the control of non-point source pollution in the Great Lakes Basin, including: the Food Systems 2002 Program, the Rural Beaches Program and the SWEEP Program.

Contaminated Sediments

Recommendation 11

The Parties ensure that improved mechanisms are put in place for the timely reporting of accurate data and statistics on dredging activities to enable maintenance of the Dredging Register called for under Annex 7 of the Agreement. (4th, p. 25)

Response 11

The 1980-1984 Dredging Register was released by Canada and the United States in September, 1990. Canada has compiled Canadian dredging data for the 1985-1989 Register. Meetings are planned between Canada and the United States to discuss mechanisms for more timely reporting of dredging data. Canada and Ontario will continue to maintain the Dredging Register in the future.

Recommendation 12

The Parties, in co-operation with the jurisdictions, accelerate the development of programs related to research, development and demonstration, and implementation of remediation technologies and ensure that adequate resources are made available to meet the commitments made with respect to managing contaminated sediments in the Great Lakes Basin Ecosystem. (4th, p. 26)

Response 12

Additional funds have been made available through the Great Lakes Action Plan (GLAP) to ensure that programs related to remediation techniques are adequately financed. The Cleanup Fund is one component of the GLAP that supports programs on contaminated sediment remediation and assessment. Potential projects are based on priorities in selected areas of federal jurisdiction reflected in Remedial Action Plans for particular Areas of Concern.

Restoration of Areas of Concern

Recommendation 13

The Parties ensure that each of the jurisdictions establish appropriate timetables to develop Remedial Action Plans in accordance with the requirements of Annex 2 and identify achievable intermediate goals or milestones as tangible measures of progress to complete restoration. (4th, p. 27)

Response 13

As part of the Canadian Remedial Action Plan (RAP) process, timetables for RAP development have been set. These timetables include milestones (i.e. the acceptance of water use goals for restoration). In addition, in compliance with the Stage II requirements under the Canada-U.S. Great Lakes Water Quality Agreement, delisting criteria will be specified along with a monitoring and surveillance plan which will measure progress in restoring impaired uses.

Recommendation 14

The Parties, in co-operation with the jurisdictions,

(a) continue to focus priority attention on development and implementation of Remedial Action Plans for the 42 currently identified Areas of Concern.

(b) develop procedures for listing and delisting Areas of Concern, and for measuring progress with respect to restoring Areas of Concern.

(c) identify and designate those locations in the Great Lakes basin which qualify as Areas of Concern based on these criteria. (4th, p. 27)

Response 14

(a) Canada and Ontario continue to provide high priority to the development and implementation of Remedial Action Plans. Overall resource levels accorded to RAP development have been significantly increased.

(b) Canada and Ontario have prepared draft principles for the development of delisting criteria to be included as part of Canada's Stage II documentation. As part of these guidelines, provision is made for consulting the public in the development of the site specific delisting criteria.

(c) To date, existing monitoring and surveillance programs have not indicated additional Canadian areas that could qualify for the Area of Concern designation. Canada and Ontario continue to evaluate all data collected through the Canada-Ontario Agreement Monitoring and Surveillance Subcommittee.

Surveillance and Monitoring

Great Lakes International Surveillance Plan

Recommendation 15

The Parties, in co-operation with the jurisdictions,

(a) continue to develop and implement joint surveillance and monitoring programs which are compatible with the

Response 15

Canada and Ontario co-ordinate their surveillance and monitoring activities through the Canada-Ontario Agreement (COA). The COA is directly responsive to the requirements of the Canada/U.S. Agreement including the recognition of the Great Lakes International Surveillance Plan (GLISP) as the "model" for the Parties' surveillance programs. Canada and Ontario have recognized that the current GLISP is the

Great Lakes International Surveillance Plan;

(b) identify current monitoring and surveillance activities that are particularly important to information needs under the Agreement, and ensure that these activities are supported in the common interests of both countries;

(c) consider the development and designation of specific Agreement core monitoring networks as international monitoring networks;

(d) agree on consultation procedures to be followed prior to reaching decisions on the reduction or elimination of activities identified or networks designated under the above. (4th, pp. 29-30)

"cadillac" version of what is "sufficient and necessary to meet Agreement requirements". Given this, the GLISP has been implemented within the restraint of the fiscal resources available to do the job. This essentially has meant that most requirements have been implemented, but perhaps not to the full extent outlined in the GLISP.

With the more explicit division of responsibilities between the Commission and the Parties under the 1987 Protocol, Canada and Ontario have recently taken steps with U.S. colleagues to identify major "core" programs which both sides agree are mandatory to report adequately on the "State of the Lakes". The most recent example of this is the Integrated Atmospheric Deposition Network developed and currently being implemented by the Parties. In addition, an inventory process is being developed to permit an assessment of accountability in implementing the GLISP. This mechanism will also ensure that core programs are not unilaterally cut by either Party without prior consultation.

Notwithstanding the above, Canada and Ontario are also aware that the Commission itself has some reservations with respect to the adequacy of the current GLISP to address Agreement needs as perceived by the Commission. In this regard, Canada and Ontario anxiously await the recommendations of the Commission's Data and Information Needs Task Force. The Parties also await the response to their Memorandum of November 30, 1989, requesting the Commission to have its Water Quality Board define more explicitly its data needs from surveillance and monitoring programs.

The Ministry of the Environment is complying with GLISP requirements primarily in tributary monitoring and long term biomonitoring. Equivalent or better methods for nearshore surveillance and monitoring are being pursued as part of the Remedial Action Plan program.

Finally, Canada and Ontario anxiously await the recommendations of the Air Advisory Board's Integrated Monitoring Task Force so that they may be better able to address, in consultation with U.S. colleagues, the core monitoring requirements in the context of the "international monitoring networks" mentioned by the Commission in this recommendation.

Integrated Monitoring

Recommendation 16

The Parties and jurisdictions work co-operatively to make existing monitoring sites more multi-functional and to develop new integrated monitoring sites as part of their joint monitoring and surveillance program. (4th, p. 30)

Response 16

The Master Site at Point Petre is an operational example of such a site which has been set up under the Integrated Atmospheric Deposition Network. A second Canadian Master Site is currently being selected along Lake Huron and is expected to be operational by January, 1992.

Recommendation 17

The Parties implement programs to permit retrospective analysis of environmental problems, including specimen banking for biological tissue and sediment, as an integral part of their joint monitoring and surveillance program. (4th, p. 30)

Response 17

The Department of Fisheries and Oceans has operated a Great Lakes Fish Tissue Archive for the retrospective analysis of contaminants since 1977. The program has focused on the various long term storage techniques to maintain sample integrity for future analysis of recently identified contaminants in the Great Lakes Basin. Currently an application has been made to the Green Plan to intensify the scope of retrospective analysis and expand the archive to include a wider range of samples.

National Health and Welfare has taken steps to construct a human tissue bank facility planned for full operation by 1993/94. Personal history questionnaires, sampling protocols, minimum sample sizes and a basin-wide human tissue sampling strategy have been drafted.

A series of reference stations (40-50 per lake) was used to collect surficial sediments from 1980 through 1983 in Lakes Ontario, Erie, Huron and Superior. This material was freeze dried and remains stored in a sediment bank at the National Water Research Institute in Burlington, Ontario.

Atmospheric Monitoring

Recommendation 18

The Parties consider the adoption of an 'atmospheric region of influence' in their planning and design of activities under Annex 15 of the Agreement. (4th, p. 32)

Response 18

The Integrated Atmospheric Deposition Network is intended to determine the mass loading of specified chemicals to each lake but it is not felt to be feasible - even with a greatly enlarged network - to identify source regions. This might be undertaken as an additional activity under Annex 15 or approached as a continental/global scale project.

Groundwater

Recommendation 19

The Parties and jurisdictions ensure that groundwater monitoring and surveillance activities are, to the extent practical, incorporated within their integrated monitoring strategies and programs. (4th, p. 32)

Response 19

The governments of both Canada and Ontario are involved in the mapping of hydrogeological conditions in the vicinity of existing and potential sources of contaminated groundwater affecting the Great Lakes. Specific locations of interest are the Niagara Frontier and the Sarnia area. It should be noted that groundwater monitoring tends to be 'site specific' rather than incorporated into more general monitoring and surveillance strategies.

Radioactivity

Recommendation 20

The Parties institute the Water Quality Board's recommended monitoring protocol, develop the capacity for intensive monitoring of atmospheric, aquatic and biological components following every unscheduled release of radioactivity and that information resulting from these monitoring activities be communicated to the Commission. (4th, p. 33)

Response 20

The governments of both Canada and Ontario are involved in monitoring releases from Canadian nuclear facilities on the Great Lakes.

As part of their licensing requirements, nuclear facilities must report routine and accidental releases of radioactivity to the Atomic Energy Control Board (AECB). Releases exceeding the operating licence limits are reported to the AECB within 24 hours of detection.

Environment Canada is undertaking work to ensure that nuclear facilities and other sources of radioactive contamination are controlled in a manner that meets the broad objectives of the Lake Ontario Toxics Management Plan and the Great Lakes Water Quality Agreement. Lake Ontario has the greatest number of nuclear facilities along its shores and has been identified in past studies as having levels of radioactivity which result in the highest dose commitment of the Great Lakes. Environment Canada has initiated a project entitled "Radioactivity - Lake Ontario". This project will involve open lake monitoring (water, sediment and biota), compilation of available information on sources of radioactivity loading to Lake Ontario, and impact assessment modelling

National Health and Welfare carries out comprehensive routine monitoring of radiological contamination in the Great Lakes Basin and the St. Lawrence River Basin. A total of 13 water and 25 air monitoring sites are monitored near 5 nuclear reactor sites. Accidental releases outside Canada are also monitored.

The Ministry of the Environment undertakes a program to monitor the concentration of radionuclides in the environment around nuclear facilities in the province including mines and nuclear power plants. The media analyzed include discharge water, drinking water, precipitation, milk and soil.

Data Management Under the Agreement

Recommendation 21

The Parties and jurisdictions review the data required for implementation of the Agreement and develop a mechanism for ensuring that it is shipped in a timely manner and consistent with quality assurance and compatible data management requirements of Annex 11. (4th, p. 35)

Response 21

The Parties are in the process of appointing binational Quality Assurance/Quality Control Co-ordinators. A top priority for the co-ordinators will be the drafting of a Parties Quality Assurance Management Plan for Great Lakes Water Quality Programs.

Recommendation 22

The Parties develop a data management policy with clearly articulated goals that reflect specific data needs responsive to the Parties' commitments under the Agreement, and that the Parties and jurisdictions review their data management programs and ensure that they are consistent therewith. (4th, p. 35)

Response 22

Environment Canada is currently developing a data management system for the proposed federal pulp and paper regulations. This system will be expanded to cover all major industry sectors to be regulated under the Fisheries Act. The Ontario Ministry of the Environment has already developed and implemented a data management system (MIDES) for the MISA effluent monitoring regulations for nine major industrial sectors.

The Implementation Plan for the Integrated Atmospheric Deposition Network makes specific reference to the development of data management procedures. This will become a priority as the amount of data collected in support of Annex 15 grows.

B. Science and Agreement Programs

Relating Observed Pollutant Loadings to the Condition of the Great Lakes

Recommendation 23

The Parties establish the linkages between loadings, ambient concentrations and ecosystem responses, in order to stimulate various source reduction strategies and understand better their effects. (4th, p. 37)

Response 23

Environmental Effects Monitoring (EEM) is included in the proposed federal effluent regulations for the pulp and paper sector under the Fisheries Act. Pulp mills will be required to conduct effluent and receiving waters assessments to establish the linkage between loadings, ambient concentrations and ecosystem responses. Results from EEM will be used to establish more stringent site-specific effluent requirements where warranted to protect sensitive receivers.

The Integrated Atmospheric Deposition Network will provide estimates of the loadings of various specific toxic substances to the Great Lakes Basin.

Human Health

Recommendation 24

The Parties give high priority to human health considerations and support research to understand the impact on human health of chronic exposure to small amounts of toxic contamination. (4th, p. 38)

Response 24

A high priority has been placed on the effects of Great Lakes pollutants on human health. Activities initiated by National Health and Welfare under the Great Lakes Health Effects Program address the toxic effects of single chemicals and mixtures of chemicals through study of laboratory animals, wildlife population impacts and human population studies. Several major population studies are under way: one on cancer incidence and mortality; one on congenital anomalies; one on farm families; two on native and non-native persons consuming large amounts of fish and wildlife; and one joint Canadian/U.S. study of the effects of acid aerosols on the health of school-aged children. Animal studies are examining the effects of exposures to ambient

concentrations of ozone, multigenerational exposures to contaminants in fish, interactive effects of priority pollutants such as hexachlororobenzene, mercury and lead and other newly identified toxic PCB congeners. Many of these studies are being carried out in collaboration with experts from other countries. All the studies are reviewed by a public advisory committee and presented at public consultation sessions.

Considerable effort is being directed towards preparing toxicology profiles of regional air pollutants for the Detroit, Windsor, Port Huron, Sarnia Air Pollution Advisory Board to the IJC.

Health Advisories

Recommendation 25

The Parties and jurisdictions evaluate the relationships between the various sampling and calculation methods for fish advisories, and develop an appropriate method to transform the values calculated by various jurisdictions to some common basis for understanding. (4th, p. 39)

Response 25

National Health and Welfare is aware of the need for harmonization of fish advisories within the basin, and the need to transform fish tissue concentration data into a comparable data bank. Differences in philosophy and jurisprudence have made harmonization very difficult. The Binational Health Issues Committee expects to address this issue in 1991/92.

The Department of Fisheries and Oceans (DFO) is undertaking research to develop mathematical relationships which would produce estimates of concentrations of selected contaminants in fillets from whole fish concentrations. However it should be noted that DFO collects data on contaminants in whole fish to satisfy requirements under its Great Lakes surveillance responsibilities (i.e. for another purpose).

Ontario Ministry of the Environment's fish consumption advisories for sport fish and the Department of Fisheries and Oceans' fish consumption advisories for commercial fish are consistent and are both based on health guidelines developed by Health and Welfare Canada.

Since 1977, the Department of Fisheries and Oceans has undertaken extensive monitoring of contaminants at all trophic levels of the ecosystem. DFO is presently seeking to expand this program by requesting new resources under Canada's Green Plan. DFO is trying to incorporate other biological monitoring programs (e.g. tumour frequency in fish) as an approach to assessing the health of the ecosystem.

The Need for Ecosystem Benchmarks

Recommendation 26

The Parties develop a protocol for designating and protecting areas as benchmarks in the long term evaluation of ecosystem integrity and the effectiveness of remedial measures within the Great Lakes Basin Ecosystem, and designate several areas in the basin. (4th, p. 40)

Response 26

Benchmarks will be established as part of the Remedial Action Plans program to measure effectiveness of RAP implementation.

Biological Monitoring

Recommendation 27

The Parties undertake programs of biological monitoring in addition to and integrated with programs of chemical monitoring. (4th, p. 41)

Response 27-29

Canada and Ontario bring to the Commission's attention, that data on reproductive success in bird species (e.g. herring gulls, bald eagles), tumours and congenital abnormalities in fish and birds, the introduction of exotic species including the river ruffe and the zebra mussel have

Recommendation 28

The Parties agree on a set of ecological measurements to be used in biological monitoring programs to provide a basis for assessing the ecological condition of the Great Lakes ecosystem. (4th, p. 41)

Recommendation 29

The Parties and jurisdictions, in developing their monitoring programs, ensure that the programs provide adequate data to assess the ecological diversity of the Great Lakes ecosystem. (4th, p. 42)

from time to time been reported to the Commission's Surveillance Subcommittee by the Parties and, indeed, highlighted as emerging problems in the Board's report to the Commission under the "State of the Lakes". The Canadian Wildlife Service has been monitoring the levels of contaminants in the eggs of Herring Gulls breeding in the Great Lakes since the early 1970s. Canada's Department of Fisheries and Oceans has been conducting a bio-index program on Lake Ontario for several years. This program looks at food chain dynamics and energy recycling in the Lakes. In addition, there is a considerable volume of information within the research community on biological cycles, etc. The question, therefore, does not seem to be the lack of information, but where to draw the line in terms of what information to present. This is a question not only on the scope of the Water Quality Agreement but the scope of the Great Lakes International Surveillance Plan.

The Ministry of the Environment uses biomonitoring extensively in an integrated fashion with chemical monitoring. Contaminant concentrations are monitored in sport fish and juvenile fish across the Great Lakes. In addition, other biomonitors such as clams, leeches and caged fish are used. Benthic surveys are routinely conducted.

Response 27

Prior to biological monitoring becoming an integral and essential component of surveillance and monitoring, suitable biomonitors must be chosen. This implies a fundamental knowledge of life histories and food web interactions of the Great Lakes ecosystem. Research at the National Water Research Institute is being conducted on aspects of zooplankton and macroinvertebrate benthic ecology. The knowledge gained in these projects has been applied to the development of ecosystem indicators for Lake Ontario and will be used similarly for Lake Erie.

Human populations are also a component of the ecosystem. National Health and Welfare has been working with other agencies to develop biomarkers and bioindicators for human populations that can provide information on ecosystem health.

Response 28

Scientists at the National Water Research Institute are working cooperatively with the Binational Ecosystem Objectives Work Group to develop suitable ecosystem objectives for all the Lakes. Currently, objectives for Lake Ontario have been recommended and protocols for assessment are being developed. The proposed objectives include aquatic communities, wildlife, human health, habitat and stewardship. Research in Lake Erie and the review of suitable mesotrophic indicators has begun.

Information on Ecological Pathways and Trophic Levels

Recommendation 30

The Parties encourage the development of information on the cycling of nutrients and energy in the Great Lakes system and ensure that this information reflects the presence of all important trophic levels. (4th, p. 42)

Response 30

Investigations on the interactions between nutrients and contaminants have examined not only the cycling of these compounds and movement between ecosystem components, but have also examined the effects of food chain length and food web complexity on cycling and body burden. It is anticipated that the results from these studies, some of which are already available, will be used in calibrating existing management models and ultimately will be used in developing and implementing comprehensive resource management strategies in the Great Lakes.

Risk Assessment

Recommendation 31

The Parties undertake research to develop and use ecosystem damage and risk functions as a tool in the assessment and management of Great Lakes resources. (4th, p. 43)

Response 31-32

The Binational Objectives Development Committee has developed ecosystem objectives for Lake Ontario and is continuing to develop such objectives for the other Great Lakes.

The Ministry of the Environment and the Department of Fisheries and Oceans are undertaking research to assess whether contaminants in fish are related to the health of the fish. Specifically, research seeks to investigate linkages between contaminant burdens and fish reproductive success, enzyme levels and tumours.

Recommendation 32

The Parties and jurisdictions undertake specific research to assess whether contaminant levels reflected in advisories are likely to have significant impacts on other components of the Great Lakes ecosystem. (4th, p. 43)

Response 32

The Ministry of the Environment is developing contaminant level advisories to protect aquatic organisms and their predators.

Specific Objectives

Ecosystem Objectives

Recommendation 33

The Parties develop agreed upon protocols for measuring the effectiveness of and revising existing and future ecosystem objectives. (4th, p. 44)

Response 33

The Parties have formed a binational Ecosystem Objectives Work Group specifically to develop and review ecosystem objectives. Ecosystem objectives for Lake Ontario have been developed and work is continuing on the development of objectives for the other Lakes.

National Health and Welfare is developing biomarkers and bioindicators to measure the effectiveness of health-based Ecosystem Objectives.

Recommendation 34

The Parties, in undertaking further work on ecosystem indicators under the Agreement, consider predatory species of birds and mammals as candidates for ecosystem objectives. (4th, p. 44)

Response 34

The process of adopting ecosystem objectives which utilize both birds and mammals has already begun with Lake Ontario and is expected to be transferred to all of the Lakes. Predatory birds and mammals are under consideration as candidates for ecosystem objectives.

Mass Loading Objectives

Recommendation 35

The Parties encourage the development of practical and innovative means of estimating mass loadings of pollutants in sufficient detail to make informed decisions as to the relative significance of the various inputs of contaminants into the Great Lakes system. (4th, p. 45)

Response 35

The Framework for Lakewide Management Plans agreed to by the Parties on Dec. 4, 1989 commits Canada and the U.S. to utilizing the mass balance approach to collecting and analysing information on sources and fate of pollutants released to the Great Lakes. Under the Lake Ontario Toxics Management Plan fate of toxics models have been developed, and data acquisition needs are now being evaluated. A Non-Point Source Load Methodology is also under development by the Four Parties for use in Niagara River Toxics Management Plan and Lake Ontario Toxics Management Plan. The methodology will use existing data to calculate total loadings and identify data gaps.

Measurements of direct atmospheric and tributary inputs, as well as the outputs and ambient concentrations for a variety of compounds, are also being made. In addition, modelling of the unmonitored portion of these components is also being undertaken for Lake Ontario. These data and modelling information should provide the essential knowledge on the relative significance of the chemical inputs to the Lake and the options available to management for reducing the inputs of various substances.

Specific Objectives for Chemical Mixtures

Recommendation 36

The Parties, when establishing the toxicological and ecological limits associated with chemicals as single pollutants, also provide information on how these chemicals are likely to behave when mixed with other chemicals, and that the Parties increase research into methods of determining the fate of toxic chemicals in mixtures with a view to developing methods that are simpler, more reliable and more cost effective. (4th, p. 46)

Response 36

The toxicological significance for humans of mixtures of contaminants is of concern. National Health and Welfare has reviewed the available published information and has concluded there is little indication of synergism but some likelihood of additivity of effects. To further address these concerns, National Health and Welfare has initiated laboratory studies of mixtures (HCB and mercury, PAH congeners, PCB congeners, and a multigeneration chemical mixtures study) and three population studies (native and non-native consumers of Great Lakes fish and wildlife and multiple pesticide exposure of farm families). Various in vitro and in vivo tests are also being developed and tested to determine if mixtures of chemicals enhance risk of genetic alteration, cancer or reproductive anomalies.

In addition to their work on the biological effects of toxic chemical mixtures, studies on quantitative structure activity relationships (QSAR) and multi-species toxicity endpoint relationships are continuing in an effort to develop other methods for predicting the fate and effects of toxic chemical mixtures.

The Ministry of the Environment has funded research at Lakehead University on the toxicity of mixtures of chemicals.

II. Fifth Biennial Report of the International Joint Commission

Persistent Toxic Substances Threaten Human Health

Recommendation A

In general, the Parties are urged to:

"take every available action to stop the inflow of persistent toxic substances into the Great Lakes environment."

General Response A

The federal governments of Canada and the United States have agreed to develop a binational pollution prevention initiative for the Great Lakes. This will focus on reducing and/or eliminating the use, generation and discharge of persistent toxic chemicals in the Great Lakes Basin. The initiative is intended to complement, but not replace, existing regulatory and legislative mechanisms for pollution control.

The initiative will focus on the following components: the development of a comprehensive Great Lakes-St. Lawrence plan for pollution prevention; bilateral U.S.-Canada demonstration projects which highlight pollution prevention activities on both sides of the border; a proactive multi-stakeholder process for determining sectoral actions for pollution prevention; an educational strategy which will incorporate all levels of decision-making from the individual to corporations and institutions; and a community based action agenda for meaningful involvement of non-point pollution sources.

This will be an interactive process in which all sectors of society can contribute and offers a non-traditional approach to implementing the philosophy of zero discharge.

The Government of Canada agrees that sustained and relatively high level exposure to persistent toxic substances is associated with increased risks of adverse human health effects. The precise nature and extent of these risks remain unclear. It is likely that some

population groups, e.g. nursing infants and heavy consumers of contaminated fish and wildlife, are at greater risk than others because of dietary habits that result in a higher than average consumption of foods that contain undesirable substances. Other groups are at greater risk because of their greater sensitivity to the chemicals to which they are exposed, e.g. the fetus, newborns, the elderly, those already in ill health. It is the intent of the Government of Canada to work co-operatively with the Province of Ontario and the Government of the U.S. to identify those populations most at risk, to quantify the risk and to develop short term and long term strategies to reduce these risks to health.

Recommendation A1

Specifically, it is recommended that:

"the Parties complete and implement immediately a national toxic substances management strategy to provide a co-ordinated framework for accomplishing, as soon and as fully as possible, the Agreement philosophy of zero discharge."

Response A1

The Ontario Municipal-Industrial Strategy for Abatement program will systematically reduce water pollution at its source with enforceable regulations which become more stringent as abatement technology improves. The ultimate goal is the virtual elimination of persistent toxic contaminants from all dischargers into Ontario waterways.

For direct industrial dischargers there will be two series of regulations: Effluent Monitoring Regulations and Effluent Limits (Abatement) Regulations. The Monitoring Regulations require the dischargers to measure the types, concentrations and total amounts of toxic substances present in their effluents. Resulting data will be used, with other information, to establish Abatement Regulations. The end-of-pipe discharge limits will be based on Best Available Technology Economically Achievable (BATEA).

There are two regulatory components to the direct municipal dischargers program: the control of direct discharges from municipal sewage treatment plants, and the control of discharges to municipal sewers from industries (Sewer Use Control Program).

Currently all industrial sector monitoring regulations have now been promulgated. Three industrial sectors have completed a year of intensive monitoring, while the other six sectors are under way.

To standardize procedures and criteria in developing Abatement Regulations, an issues resolution process is under way to resolve key issues common to all industrial dischargers. Representation from the Ontario Ministry of the Environment (MOE), Environment Canada, the MISA Advisory Committee, industry and municipalities are participating in resolving these issues.

Costs have been estimated for municipal compliance with various proposed Sewage Treatment Plant Regulations. Discussions are being held by MOE and the Ministry of Municipal Affairs on the affordability of the proposed regulation. Possible strategies for assisting in its implementation are also being considered. The MISA Sewer Use Control Program will help eliminate the discharge of toxic contaminants and pollutants into sanitary sewers. To assist in the continued development and implementation of the program, the Ontario Ministry of the Environment is undertaking a number of projects. These projects include a Sewer Use Training Program for municipal staff, Municipal Demonstration Projects to determine the practicality of the sewer use program and the development of a Computerized Data Management System. Approximately twenty municipalities have already promulgated new sewer use by-laws which are based on the 1988 Model By-Law. These twenty municipalities represent about 60 per cent of Ontario's population.

The Environmental Protection Branch of Environment Canada is working strenuously towards controlling and reducing Great Lakes contamination. Specific regulatory initiatives being developed in the coming year aimed at achieving these goals include: Dioxins and Furans Release in Pulp & Paper Mills' Effluents Regulations; New Substances Notification Regulations for Polymers and Chemicals; Contaminated Fuel Regulations; Export and Import of Hazardous

Waste Regulations. As well, other regulations already in force are being strengthened, including: Pulp and Paper Effluent Regulations, Vinyl Chloride Regulations, Secondary Lead Smelter Regulations; Chlorobiphenyl Regulations; and further down the road the Metal Mining Liquid Effluent Regulations and Chlor-Alkali Mercury release Regulations.

The Integrated Atmospheric Deposition Monitoring Network has been established to measure loadings. It will be necessary to support control programs with monitoring tailored to assessing specific sites.

Recommendation A2

"the Parties and all levels of government, including local authorities, co-operatively develop and implement appropriate legislation, standards and/or other regulatory measures that will give enforceable effect to the principles and objectives of the Agreement on a basin-wide basis."

Response A2

See Response to 5th Biennial, Recommendation A1.

National Health and Welfare has been developing a National Drinking Water Safety Act to ensure uniform quality of drinking water for all Canadians. Within the Great Lakes Basin, native peoples' drinking water supplies will be monitored under this legislation.

Recommendation A3

"additional review and co-ordination measures be put into effect to ensure other legislation and/or regulations presently in place that affect matters relevant to the Great Lakes environment - or those enacted in the future - are not inconsistent with Agreement Objectives."

Response A3

See Response to 5th Biennial, Recommendation A1.

Recommendation A4

"the measures pursuant to the foregoing include provisions for initiation, implementation and co-ordination of action at all levels of government to enforce the enacted laws and/or regulations."

Response A4

See Response to 5th Biennial, Recommendation A1.

Recommendation A5

"the Parties strengthen the principle of reverse onus in policies and programs concerned with the introduction of new chemicals, through appropriate legislation and/or regulations that include mandatory pretesting prior to approval and use."

Response A5

Environment Canada is currently finalizing the Domestic Substances List (DSL) called for by the Canadian Environmental Protection Act (CEPA). The list will specify substances already in use in Canada that are exempt from notification and assessment under the new substances provisions of the Act. Substances that are not on the DSL, however, will require notification and assessment before they can be manufactured in or imported into Canada. Notification information required will be prescribed by regulation and will include physical, chemical, and toxicity data.

Recommendation A6

"the Parties, in their next biennial reports to the Commission pursuant to Annex 12:

Response A6

Both Environment Canada and the Ontario Ministry of the Environment are working towards establishing effluent limitations for the critical pollutants that are related to point source discharges (i.e., mercury, lead, dioxins, and furans). The proposed federal

*report on the extent to which discharges of 11 critical pollutants previously identified with the Great Lakes Water Quality Board - and known to have serious detrimental effects on living organisms - have been explicitly considered in the issuance of National Pollutant Discharge Elimination System (NPDES) permits and control orders.
*assure the Commission and the public that no municipal, industrial or combined sewer overflow discharges because of these substances are or will ever be permitted.
*assess and report on the extent to which these 11 substances are used, stored and released in the basin by non-point rural and urban sources, including landfills and groundwater, and the measures being taken to prevent their further release into the Great Lakes from these sources
*report on the extent to which monitoring is in place to confirm that discharges of these chemicals are not occurring."

regulation under CEPA will result in the virtual elimination of dioxins and furans from mills using chlorine bleaching processes. Mercury in effluent from the only chlor-alkali mercury facility in the Great Lakes Basin (ICI, Cornwall) is regulated under the Fisheries Act Effluent Regulation. Ontario's MISA program has completed the voluntary comprehensive 'pre-regulation monitoring program' and is completing the one-year effluent Monitoring Regulation program for nine industry sectors. This program will generate the most comprehensive toxics database for the development of effluent limits by 1992.

The Ministry of the Environment is currently developing a combined sewer overflow policy to limit the extent of overflows and establishing their required treatment.

Recommendation A7

"the parties designate Lake Superior as a demonstration area where no point source discharge of any persistent toxic substance will be permitted. This recommendation should not prejudice or delay the implementation of our other recommendations."

Response A7

Environment Canada, the Ontario Ministry of the Environment and the U.S. EPA are discussing initiatives to address the IJC's recommendation of using Lake Superior as a model for zero discharge.

In Canada's Green Plan, virtual elimination has been adopted as a national goal. To achieve zero discharge, the Green Plan commits Canada to work with the United States on the development of a bilateral action plan for comprehensive pollution prevention in the Great Lakes and St. Lawrence River Basin. The Government of Canada will also commit funding for technology demonstration and community education projects to support the pollution prevention action plan.

Recommendation A8

"The Parties sponsor and fund research projects to:
*replicate and expand on studies which demonstrate relationships between chemical exposure and human health in the Great Lakes Basin and elsewhere;

*identify other exposed populations and biological species and investigate the effects of chemical exposures on them."

Response A8

In 1989, the Government of Canada committed $20 million over five years to the Great Lakes Health Effects Program. This program is dedicated to public consultation and the development of projects with short term response times that address the relationship between chemical exposure and human health. Projects have been detailed in other responses to the recommendations of the 4th and 5th Biennial Reports.

B. Implementing the Agreement at the State, Provincial and Local Levels

Recommendation B

The second general recommendation is:
"all levels of government accept, and encourage others to accept, their responsibility to implement the Great Lakes Water Quality Agreement, and give priority to actions that contribute to the protection and restoration of the Great Lakes Basin Ecosystem."

General Response B

The federal and provincial governments, through voluntary program initiatives (e.g. the Pollution Prevention Initiative), legislative initiatives (e.g. MISA, CEPA) and financial initiatives are encouraging municipalities and private industry to comply with environmental objectives. More specifically, within the Canadian Great Lakes Basin, these initiatives encourage municipalities and industries to accept their responsibility to implement the Great Lakes Water Quality Agreement.

Recommendation B1

More specifically, it is recommended that:
"the Parties and jurisdictions fully inform and involve local governments with respect to their potential contribution towards achieving the Purpose and Objectives of the Agreement, and local governments accept responsibility to assist in the implementation of the Agreement."

Response B1

The significance of municipalities, not only as stakeholders, but also as partners in the implementation of the Agreement, is reflected in their participation on various Great Lakes Remedial Action Plan Teams and Public Advisory Committees. Municipal representation is also sought in the development of regulations under MISA, Ontario's Municipal-Industrial Strategy for Abatement, designed to reduce persistent toxic discharges to the Great Lakes. The Province of Ontario also provides financial support to municipalities toward the development of pollution control plans and implementation of control measures to reduce storm and Combined Sewer Overflows to the Great Lakes.

Recommendation B2

"the Parties and jurisdictions review and strengthen Great Lakes fish consumption advisories as necessary, and re-evaluate stocking programs for those fish which pose a threat to the health of animals and humans when consumed."

Response B2

The Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources have expanded the list of contaminants being tested in sport fish to include PAHs, chlorinated phenols and chlorinated benzenes. This information will assist Health and Welfare Canada in setting consumption guidelines for these contaminants, if required.

Recommendation B3

"the Parties prepare and urge the use of a comprehensive public information and education program."

Response B3

On an ongoing basis, both Environment Canada and the Ontario Ministry of the Environment will continue to promote and produce Great Lakes public information materials. Some of these materials will be produced in conjunction with other federal departments and provincial ministries. Environment Canada has produced a new Great Lakes fact sheet, **Toward a Healthy Great Lakes - St. Lawrence Ecosystem - Clean Waters.**

A binational Great Lakes Information Network has also been structured, including representatives from the Great Lakes states, federal and provincial governments and non-governmental organizations. The Network sponsors an Annual Great Lakes Communications Workshop, co-ordinated by the Great Lakes Commission. The focus of this Network is to promote informal participation and information sharing in the Great Lakes Information Community.

National Health and Welfare has prepared a detailed communication and public consultation strategy. The strategy has been built on a public consultation process and emphasizes partnership. National Health and Welfare is now developing educational aids and actively supporting public information meetings

in communities around the basin to hear and respond to public concerns. It has co-sponsored a basin-wide educators teleconference with the IJC.

Recommendation B4

"the Great Lakes states and provinces incorporate the Great Lakes ecosystem as a priority topic in existing school curricula."

Response B4

The federal and provincial governments will continue to produce public education and information materials. At this time these materials include the Great Lakes Atlas (produced jointly with the U.S. EPA), The Report of the Parties, RAP newsletters and various Great Lakes fact sheets. Working with the new Federal Directorate for Environmental Education, the COA Information Committee and Environment Canada's Great Lakes Environment Office will promote and assist with the development of educational materials on Great Lakes issues. The Directorate's mandate includes the co-ordination of education proposals within the school curricula. Additional Great Lakes education materials are available from outside agencies and organizations.

Recommendation B5

"jurisdictions use the Great Lakes Areas of Concern as focal points for the development of educational programs and materials."

Response B5

The Canada-Ontario Agreement RAP Steering Committee has prepared a new Remedial Action Plan brochure to inform the public about how these plans will help to improve water quality in seventeen designated Areas of Concern on the Canadian side of the Great Lakes. The COA Information Committee will continue to assist with the production of individual Remedial Action Plan newsletters and fact sheets for distribution to the general public in Areas of Concern, as well as assist with the development of Community Public Involvement Programs.

C. Remedial Action Plans

Recommendation C

The third general recommendation is:
"the Parties give high priority to the development and implementation of RAPs, taking into account the need for public involvement throughout the process."

General Response C

In the development of the Canadian RAPs, particular attention has been given to ensuring that the public is consulted in all aspects of the RAP program.

Recommendation C1

More specifically, it is recommended that:
"the responsible Parties and jurisdictions revise all RAPs that the Commission has found do not meet Stage 1 requirements."

Response C1

Under the Canada-Ontario Agreement, Canada and Ontario have committed to providing updated and additional information in response to comments from the IJC. This additional information will be provided as part of the Stage II documentation progress reports.

Recommendation C2

"the responsible jurisdictions accelerate the preparation and submission of RAPs for the remaining Areas of Concern and provide the technical and financial resources needed for their implementation."

Response C2

Canada and Ontario view present schedules as appropriate given the requirements for technical investigations and public consultation. Where possible, RAP development is being expedited and implementation initiated prior to submission of Stage II documentation. Canada and Ontario are currently investigating resource needs and funding mechanisms to ensure a consistent implementation framework. Environment Canada's Cleanup Fund also supports RAP implementation.

Recommendation C3

"the Parties and jurisdictions encourage the participation of interested organizations and individuals throughout RAP development and implementation by sustaining community participation groups already established, and creating comparable institutional mechanisms in the other Areas of Concern."

Response C3

Under COA, Canada and Ontario have instituted a comprehensive program of public participation and information. Public Advisory Committees (i.e. stakeholder groups) have been established for 16 Areas of Concern. In addition a program wide council of Public Advisory Committees was established in 1990.

Recommendation C4

"the jurisdictions include a detailed plan for public participation as part of the Stage 1 submission of RAPs."

Response C4

Canada's Stage 1 submissions currently include a full description of public participation activities.

D. Spills: Potential for Catastrophe

Recommendation D

The fourth recommendation states: "the Parties strengthen and adopt provisions for the prevention of spills of toxic and other hazardous substances from vessels and other sources, and ensure they are prepared to deal with emergencies that may arise."

General Response D

The Federal Government's Green Plan and the report of the Public Review Panel on Tanker Safety and Marine Spills Response Capability, **Protecting Our Waters**, address those capabilities and make appropriate recommendations.

The conclusion of the Public Review Panel on Tanker Safety and Marine Spills Response Capacity is that there is strong evidence that double bottoms or hulls do limit pollution from groundings and collisions.

The Green Plan also acknowledges this evidence and states that "Sea-going tankers that bring chemical and petroleum products to this country and export them from Canadian ports represent a major potential marine threat". The government's objective is to implement measures that will result in an environmentally safer method of transporting petroleum products by water. Although no single design feature can completely eliminate accidental oil spills, the Canadian Coast Guard advised that the double hulls have the potential to prevent or significantly reduce outflows from low impact groundings or collisions. For this reason, the federal government will begin consultations with tank-ship owners and operators for phasing in this important measure.

The Coast Guard is developing standards for barges carrying oil and noxious substances and will be consulting with industry operators.

Recommendation D1

Specifically, it is recommended that: "the Parties increase pilotage requirements for all vessels carrying oil and hazardous substances in the Great Lakes."

Response D1

Pilotage in the international waters of the St. Lawrence River and the Great Lakes is a joint responsibility of Canada's Great Lakes Pilotage Authority (GLPA) and the U.S. Coast Guard. There are continuous bilateral discussions on the subject between these two entities, and the respective administrations.

The U.S. Oil Pollution Act of 1990 enacted a number of changes regarding pilotage, including a redefinition of those individuals who may serve as pilot on Undesignated Great Lakes Waters.

In April 1991, the Canadian Coast Guard plans to release its discussion paper on the issues raised in the September, 1990 report of the Public Review Panel on Tanker Safety and Marine Spills Response Capability and will begin the process of consulting with industry and the public. These consultations will form part of the first step in the

development of a comprehensive plan for implementing improvements as recommended by the Public Review Panel report. Because of their regulatory responsibilities under the Pilotage Act, all four Pilotage Authorities (Atlantic, Great Lakes, Laurentian and Pacific) are presently reviewing the Public Review Panel's report and its recommendations from the regulatory perspective.

The report of the Commissioner of Inquiry into proposed regulatory amendments by the GLPA, released by the Minister of Transport in May 1990, is currently under ministerial review.

Recommendation D2

"the Parties improve communication and tracking of all vessels carrying oil and hazardous cargoes."

Response D2

Work has begun on a comprehensive review of national requirements for vessel traffic services for high-risk and environmentally-sensitive areas. Vessel traffic services are important prevention systems and are the subject of numerous panel recommendations.

The Green Plan says that, "Over the next five years, preventative measures will be enhanced. They will include improvements to highest-priority radar and vessel traffic control facilities, electronic charting for tankers, increased inspection of vessels and increased aerial surveillance. By the end of 1991, on-board inspection of foreign-flag vessels will be increased."

Recommendation D3

"the Parties enhance the capability of the Coast Guard and other relevant agencies to respond to all spills of oil and hazardous polluting substances."

Response D3

The government accepts the conclusion of the Public Review Panel on Tanker Safety and Marine Spills Response Capability that the Canadian Coast Guard's role and responsibilities as lead agency in responding to spills must be clearly defined and strengthened through formal designation. In addition, the requirements for personnel, training and equipment to ensure strong, immediate response to pollution incidents by the Coast Guard is being carefully examined.

The Green Plan also addresses this problem and states that, "On the response side, the federal government will improve Canada's existing response capability for oil and chemical spills into coastal waters. The role and responsibilities of the Canadian Coast Guard as lead agency in responding to marine spills will be more clearly defined and strengthened.

Over the next five years, measures will be introduced to improve marine spill contingency planning, upgrade cleanup equipment, improve and expand training programs for response personnel, and increase research and development focusing on spill response techniques and technologies."

The Ontario Region of the Canadian Wildlife Service has prepared a response plan to enact in the event of an oil spill in the lower Great Lakes. Five permanent and two mobile oil cleaning stations from Ottawa to the St. Clair National Wildlife Area have been established to rehabilitate and clean oiled birds. Scaring devices will be used to control birds near oil spills.

By the end of 1993, a greater number of better equipped and better trained response crews will be in place throughout Canada.

Recommendation D4

"the Parties review the adequacy of funding for spill-related monitoring and enforcement."

Response D4

The federal government believes that Canadians have a right to adequate compensation when they are directly affected by marine pollution accidents and that the compensation regime must be improved. The government will examine the appropriate level of compensation, as well as use of the Ship Source Oil Pollution Fund and levy to finance improvements to Canada's prevention and response capability, as recommended in **Protecting Our Waters** by the Public Review Panel on Tanker Safety and Marine Spills Response Capability.

Recommendation D5

"the Parties examine the extent to which the provisions of Annexes 4,5,6,8 and 9 have been complied with, and take appropriate steps to remediate any deficiencies."

Response D5

There are regular annual meetings between the Canadian and U.S. Coast Guards, where progress towards the achievement of the objectives of Annexes 4, 5, 6, 8, and 9 of the Agreement is reviewed. The results of these meetings form the basis of a report which is submitted to the IJC.

E. The Parties' Response to the 5th Biennial Report

Recommendation E

The fifth recommendation states: "in order for the Commission to better assist the Parties in implementing the Agreement, the Parties should respond to the Commission's recommendations following every other semi-annual meeting of the Parties. This response should include the status with respect to implementation of these recommendations or the reasons why a delay has occurred or action has not been taken."

General Response E

This **Second Report of Canada** fulfils this reporting requirement for the period January 1, 1989 to December 31, 1990. The Parties will be establishing a more formal process for delivery of Agreement obligations, including reporting on progress towards implementation. The Commission can expect more regular reports.

III. Response of the Canadian Government to the September 1990 International Joint Commission/Great Lakes Fishery Commission Report Entitled "Exotic Species and the Shipping Industry: The Great Lakes-St. Lawrence Ecosystem at Risk"

Recommendation 1

- The United States and Canada require all oceangoing ships to exchange their ballast waters in mid-ocean, before entering the Great Lakes or connected fresh and brackish waters. In those instances when mid-ocean exchange proves inappropriate for safety or other reasons, ballast water must not be discharged unless there has been previous environmentally safe exchange or treatment to remove or destroy all organisms capable of surviving in the waters of the Great Lakes ecosystem;

Response 1

The current Canadian Coast Guard system of ballast control guidelines requests that ships bound for the Great Lakes exchange ballast water at sea. Due to safety and operational reasons and the current absence of an environmentally acceptable alternative for ships unable to comply with 'at sea' exchange, regulations are not presently deemed to be practicable. Non-complying ships are being requested to exchange ballast in the St. Lawrence River, prior to entry into the Lakes.

Recommendation 2

- the United States and Canada, through their Coast Guards and other responsible agencies, co-ordinate their ballast water exchange and treatment programs as fully as possible for purposes of standardization, monitoring and enforcement;

Response 2

Preliminary discussions have been held between the Canadian and United States Coast Guards, aimed at developing an integrated set of ballast exchange guidelines for use during the 1991 shipping season. For the longer term, a safe, compatible, and environmentally acceptable regulatory approach is being investigated by both countries.

Recommendation 3

- the United States and Canada ensure, in co-operation witH shipping and other interests, that a major applied research and development program is established and co-ordinated that devises and tests improved measures for the exchange and or treatment of ballast water; and

Response 3

Both the Canadian and the United States Coast Guards plan appropriate Research and Development projects to seek effective means of treating or retaining ballast water in ships' tanks, as a possible precursor to introduction of regulatory controls.

Recommendation 4

- the Governments of the United States and Canada work together to foster and encourage long term strategic research on all dimensions of the exotic species problem.

Response 4

As a result of the IJC/GLFC report on Exotic Species (September, 1990), the Department of Fisheries and Oceans, the Department of Transport and Environment Canada co-operated to fund a $250,000 ballast water contract with Canadian and U.S. researchers. The contract sought to quantify the rate of voluntary compliance on ballast exchange of ships entering the Great Lakes. A further objective was to determine the possibility of more exotic species invading the ecosystem as a result of foreign ships exchanging their ballast in the Great Lakes. The study is expected to be completed by mid 1991.

Subject to availability of the necessary funding, both countries will continue to work collaboratively in the application of research and development projects to the full range of exotic species problems.

Recommendation 5

- Canada and the United States instruct their national delegations to the Internation Maritime Organization of the United Nations to augment and strengthen existing conventions, codes and processes in order to:
  - establish the significance of the global - though largely unrecognized - problem of shipborne introductions;
  - assist in the development of standardized policies to address ballast transfers; and
  - provide leadership and expertise for a co-ordinated exploration of opportunities to design new vessels and retrofit existing vessels to maximize effectiveness, ecological acceptability, occupational safety, and cost effectiveness of ballast water exchange and treatment practices.

Response 5

At the 30th Session of the Marine Environment Protection Committee (MEPC) of the International Maritime Organization, a draft MEPC resolution and an accompanying set of international ballast water control guidelines was developed by a working group, which included representatives of Canada and the United States. The developed material will be circulated intersessionally to member states, with a view to its adoption by MEPC at its 31st Session in July 1991.

APPENDIX THREE

Government Contact List by Issue

This appendix provides contact names for many of the programs addressed within this report. Contacts are listed by issue and include the appropriate page reference in brackets as well as names, addresses and phone numbers of the federal and/or provincial representatives where appropriate.

The Great Lakes Action Plan (5-8)

Public Involvement in the Great Lakes Action Plan (5)

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Program Co-ordinator,
Public Involvement
Great Lakes Environment Office
C&P-OR, Environment Canada
25 St. Clair Avenue E., 6th Floor
Toronto, ON M4T 1M2
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The Great Lakes Preservation Program (6)

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Great Lakes Environment Office
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(416) 973-8632

The Great Lakes Health Effects Program (6-7)

Dr. Andy Gilman
Manager
Great Lakes Health Effects Program
Department of Health and Welfare
Environmental Health Centre
Room 136
Tunney's Pasture
Ottawa, ON K1A 0L2
(613) 957-1876

The Great Lakes Cleanup Fund (6)

Griff Sherbin
Senior Advisor
Great Lakes Environment Office
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Public Participation

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Consultation Co-ordinator
Great Lakes Health Effects Program
Department of Health and Welfare
Environmental Health Centre
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Tunney's Pasture
Ottawa, ON K1A 0L2
(613) 952-8117

The Great Lakes University Research Fund (7)

Janet Cooley
A/Corporate Science Liaison Officer
Science Liaison Division
National Water Research Institute
Box 5050, 867 Lakeshore Road
Burlington, ON
L7R 4A6
(416) 336-4827

The Pollution Prevention Initiative (8)

Madelyn Webb
Project Director
Pollution Prevention Initiative
Environment Canada
25 St. Clair Avenue East, 6th Floor
Toronto, ON
M4T 1M2
(416) 973-8638

Environmental Partners Fund (9)

Paul Bubelis
A/Program Manager
Environmental Partners Fund
Ontario Region
Environment Canada
25 St. Clair Avenue East, Suite 324
Toronto, ON
(416) 973-1076

Canadian Healthy Communities Project (10)

For information, advice on how to get a local project started, organizational skills, and linkages with other communities, contact:

Susan Berlin
Co-ordinator
Canadian Healthy
Communities Project
126 York Street, Suite 404
Ottawa, ON K1N 5T5
(613) 233-2105

Canada's Green Plan (8)

Ian Ferguson
Secretary, Committee of Regional
Executives
Ontario Region
Environment Canada
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Toronto, ON M4T 1M2
(416) 973-7703

The St. Lawrence Action Plan (9)

Hélène Perreault
St. Lawrence Centre
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Contaminated Sites Cleanup (10)

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Director
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Canadian Centre for Inland Waters
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Don Bartkiw
Ontario Ministry of the Environment
Technology and Site
Assessment Section
2 St. Clair Avenue West - 14th Floor
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(416) 323-5151

Ontario Round Table on Environment and Economy (10)

Rick Findlay
Executive Director
Ontario Round Table on Environment
and Economy
790 Bay Street, Suite 1103
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(416) 327-2032

Strategic Plan for Ontario Fisheries II (11)

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Vehicle Emissions Strategy (11)

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Director, Air Resources Branch
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Environmental Technology Program (11)

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Safe Drinking Water Act (12)

Jim Ashman
Director
Water Resources Branch
Ontario Ministry of the Environment
1 St. Clair Avenue West, 4th Floor
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Watershed Management Planning Strategy (12)

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Manager
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Air Toxics (15)

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ARQI
Atmospheric Environment Service
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Air Resources Branch
Ontario Ministry of the Environment
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M5S 1Z8
(416) 326-1667

Transboundary Airborne Pollutants (16)

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Director
Climate Response Strategies Branch
Environment Canada
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La Salle Academy
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(819) 943-1535

Ed Piché
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Contaminated Sediments (16)

Susan Humphrey
A/Head
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Contaminated Sediments
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Deo Persaud
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Groundwater (17)

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Groundwater Management
Drinking Water Section
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Pesticides / Non-Point Source Pollution (17)

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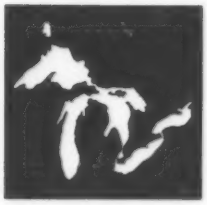

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